THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXVII. No. 1984.] LONDON, MAY 21, 1901. [53RD YEAR. PRICE 6d.

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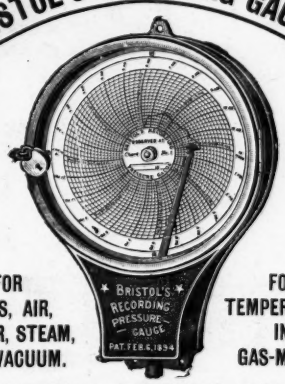

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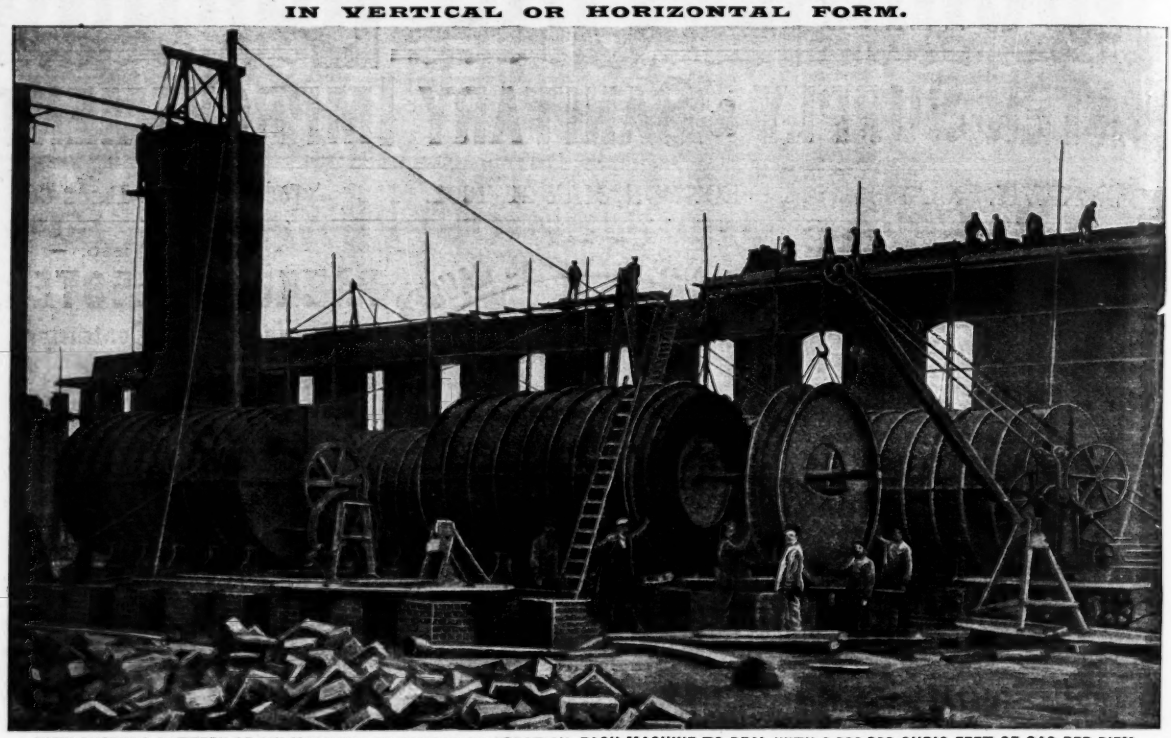

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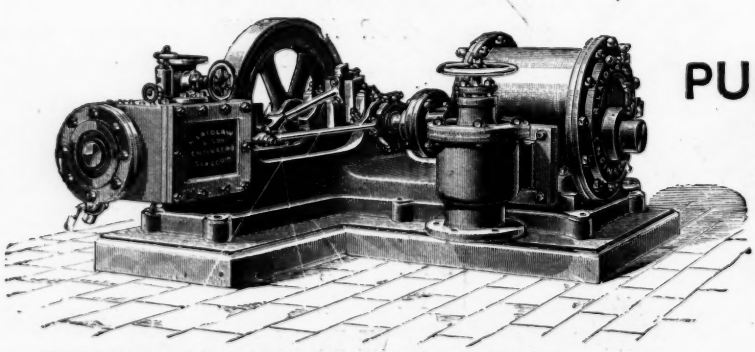

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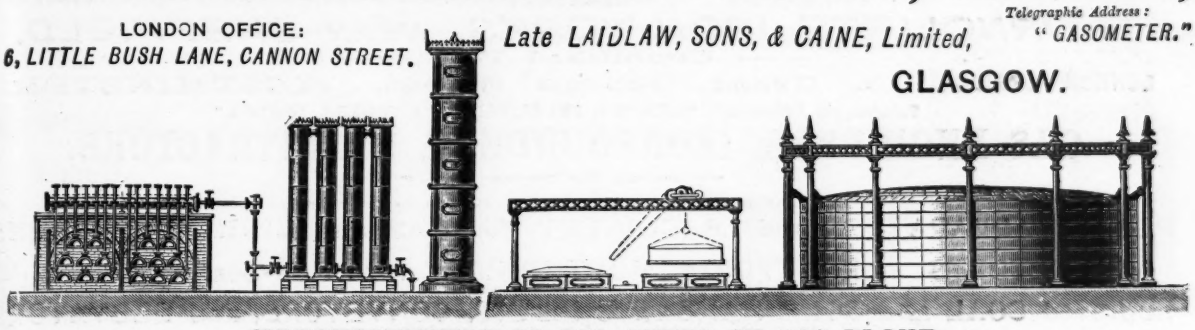

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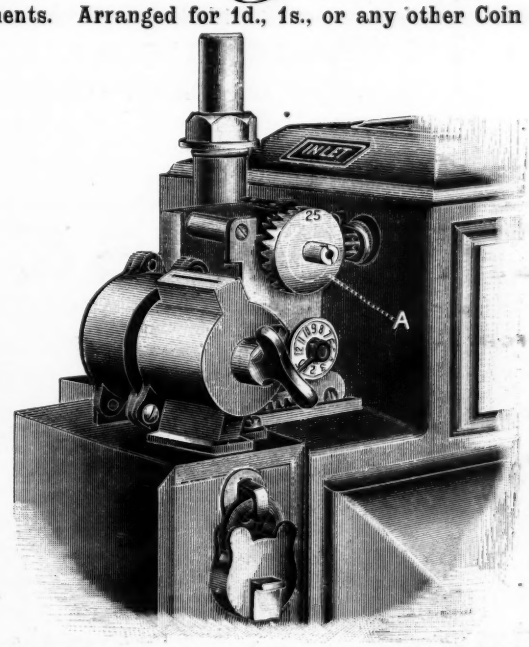

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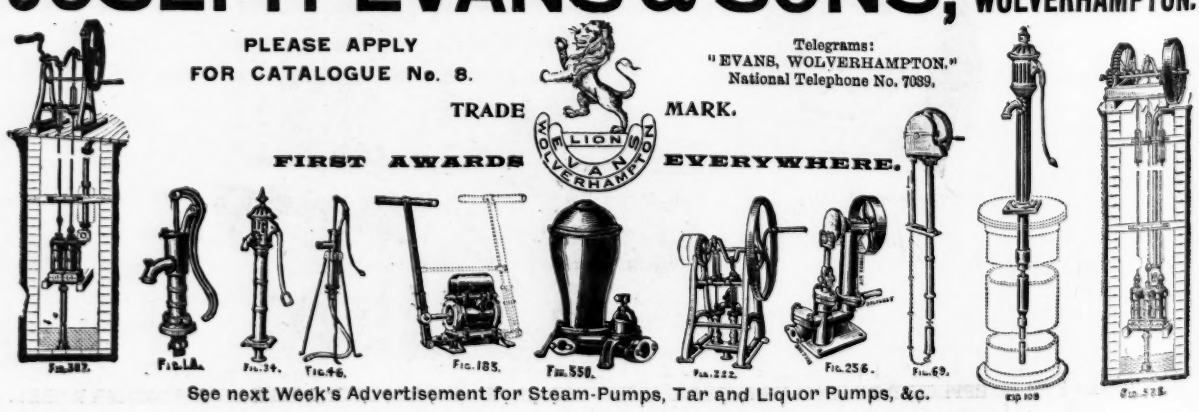

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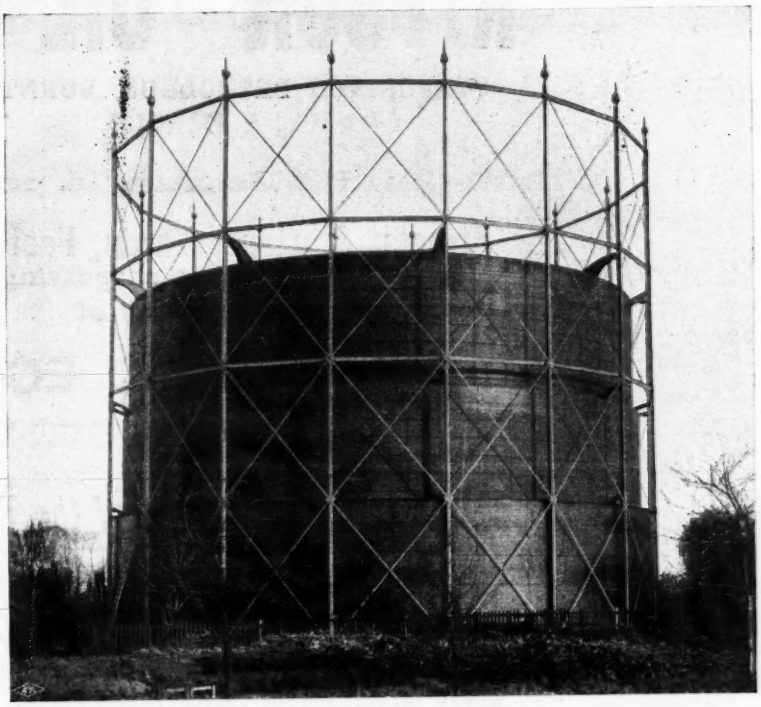

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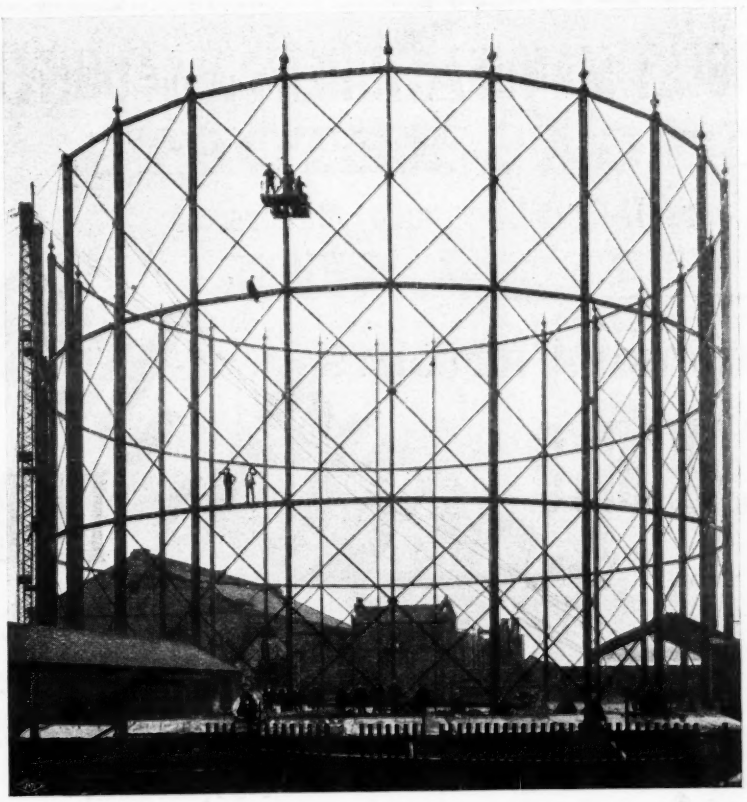

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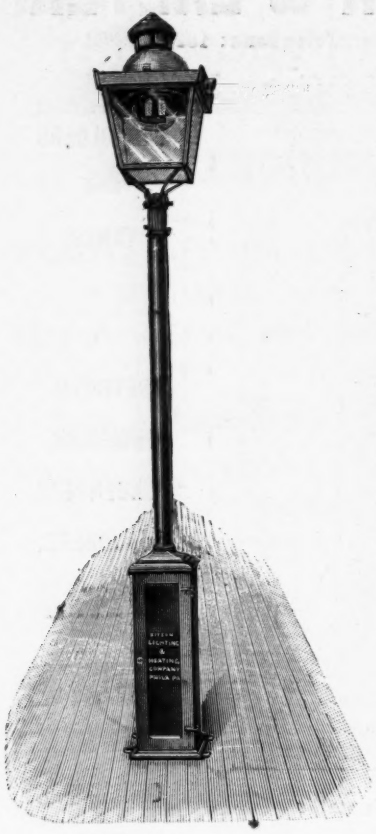

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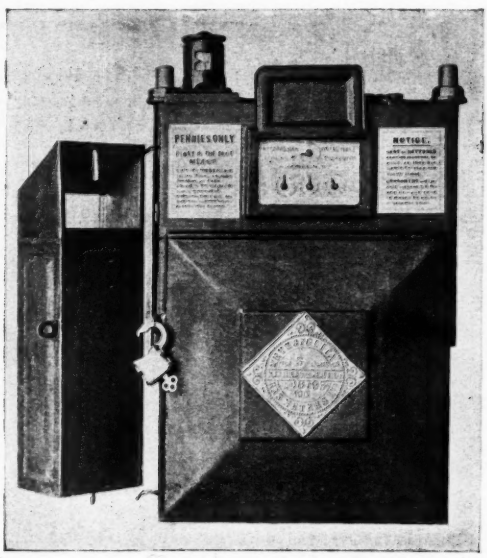

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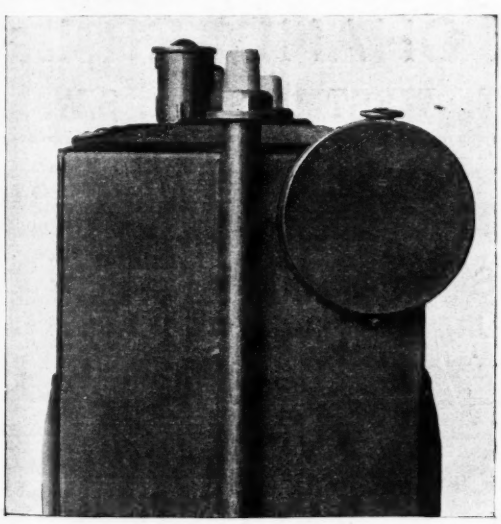

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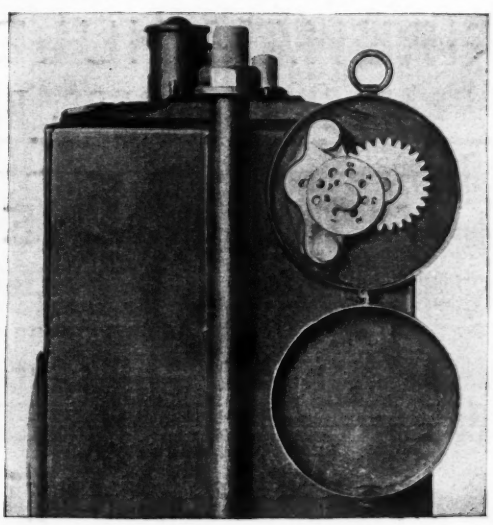

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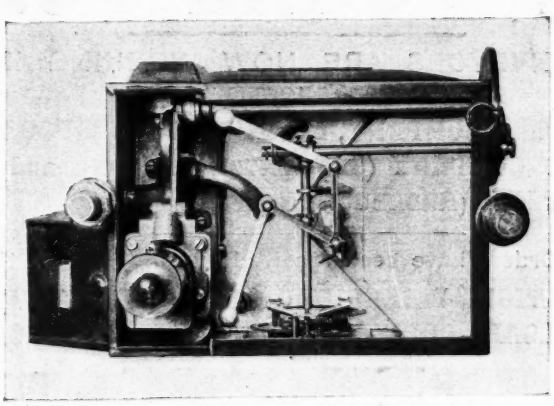

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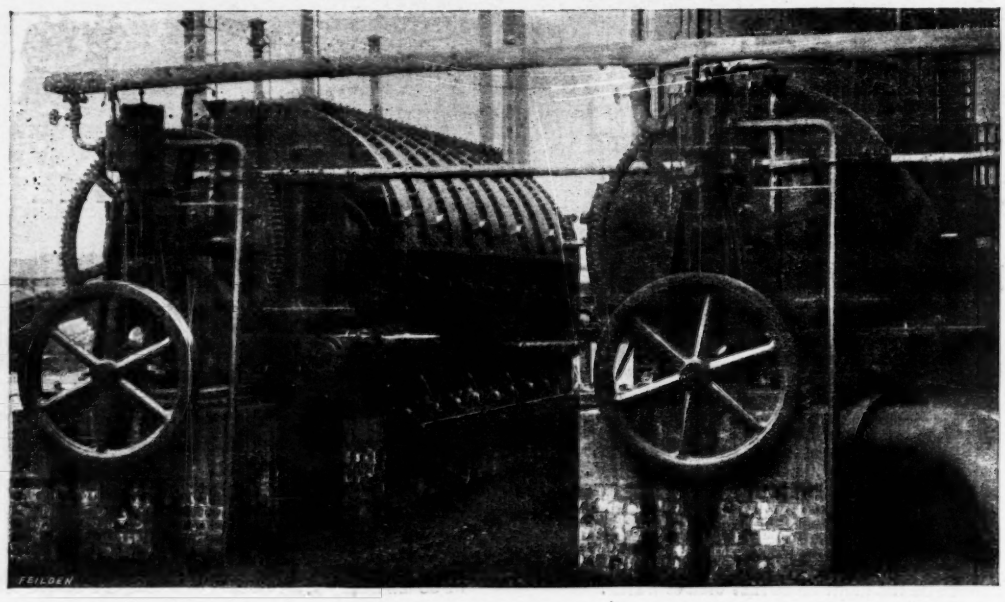

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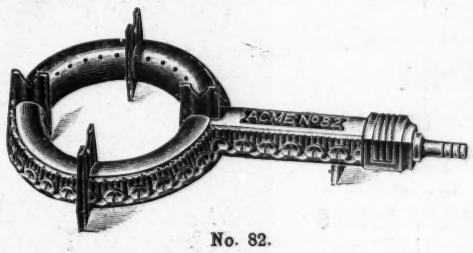

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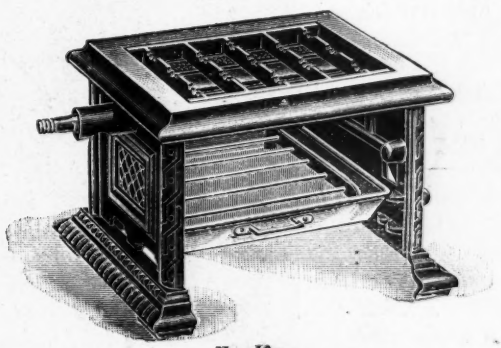

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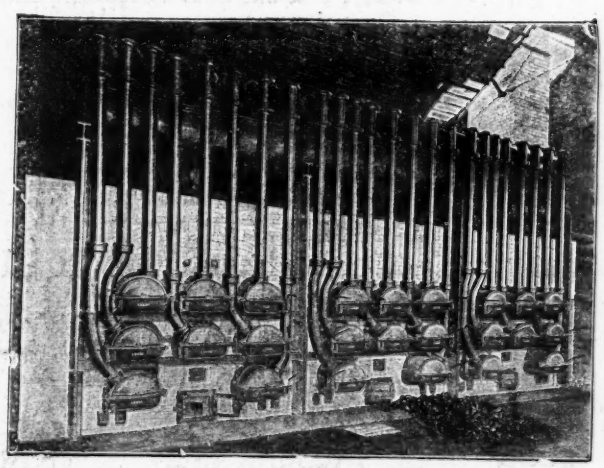

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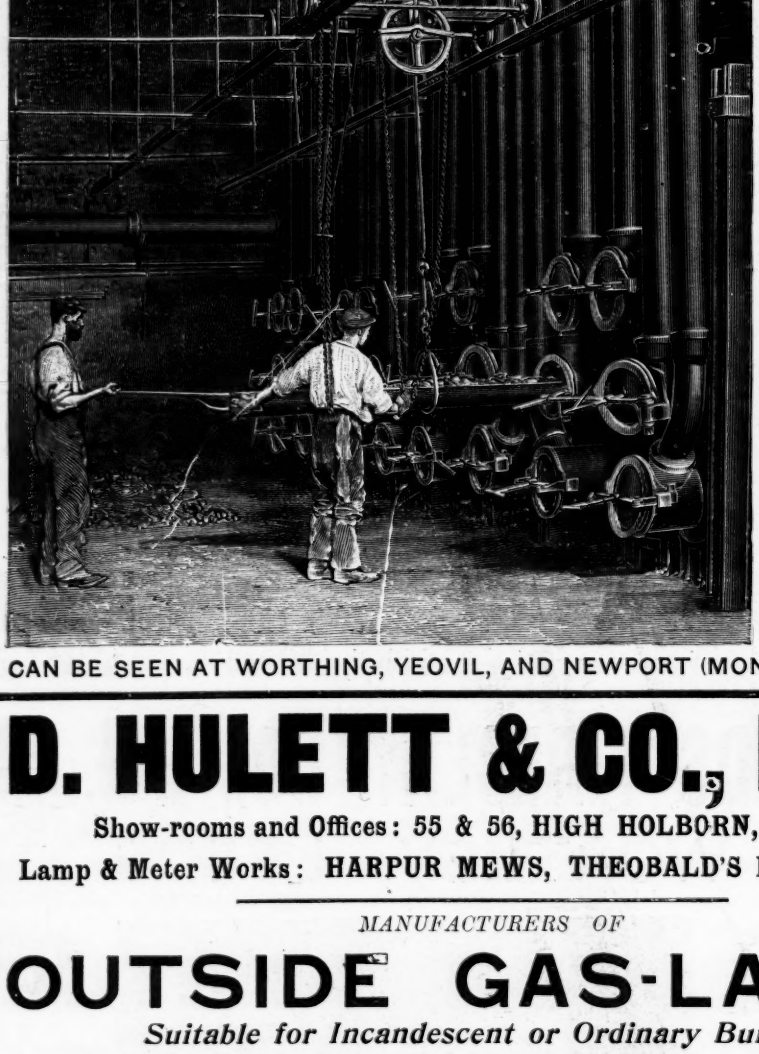

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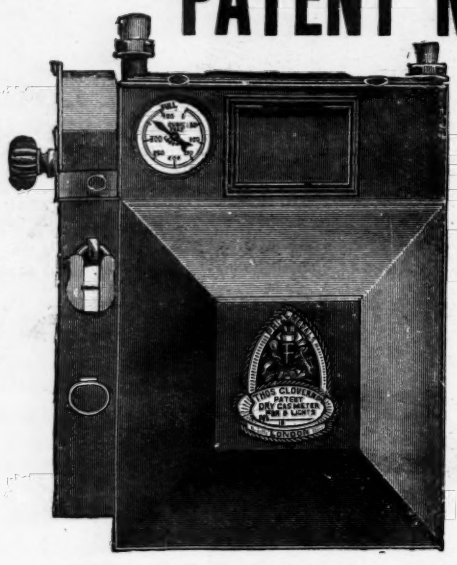

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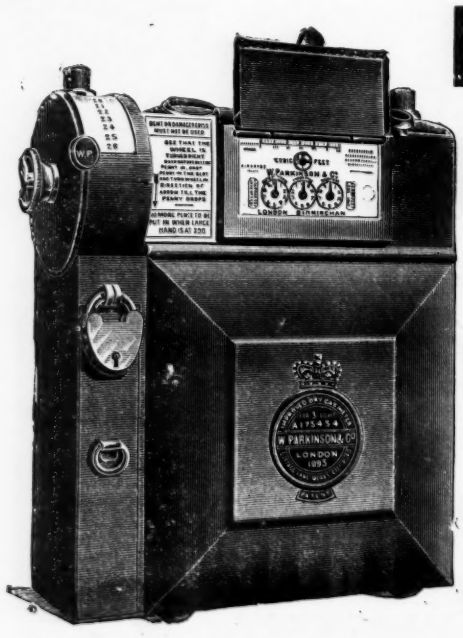

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EDITORIAL NOTES.

The Business Man's Attitude towards Education.

As Stein once wisely said, "What is put into the schools of "a country comes out in the manhood of the nation." That being so, everyone who has need to employ that manhood is directly interested in the efficiency of the schools; and the education problem is seen to be a matter not to be left to the petty jealousies of the conflicting scholastic interests nor to the squabbles of differing faddists. It is, therefore, earnestly to be hoped that the tentative measure introduced by the Government in order to overcome the difficulty created by the "Cockerton" judgment may receive the earnest consideration of the business men in the House of Commons, and be made to provide the groundwork, in the end, of a more homogeneous and rational system of education than we at present possess. Such is clearly the hope entertained by Mr. Balfour; but the difficulty of achieving a satisfactory settlement of this education question has been so great in the past —and is not lessened by the ever-growing tendency of Parliament to talk rather than carry on the business of the nation for the benefit of the nation—that one may well despair of our ever doing more than "muddle along" in educational as in other matters.

We have, in fact, got no "system" of education whatever beyond that provided by the Board Schools. After that only a chaos of overlapping—mostly inefficient, or altogether too costly—institutions for the provision of "secondary," technical, or commercial education. What we sadly need is a series of grades of schools, working in harmony, and adequately endowed, providing by successive stages a course of education which would finally make of a young man able and willing to follow the complete course a thoroughly efficient citizen. We also need that the want of such highly trained and efficient servants should be recognized by employers. Our manufacturers are too prone to call in scientific knowledge as a last resort, instead of as a primary requirement for the full success of a business undertaking. It is very galling to have to be always calling attention to the better sense of other nations in this respect; but it is undoubtedly the fact that in Germany they do not make this blunder. They know the commercial value of science and research; and accordingly they see that they get it. Is not the great advancement made in the coal-tar industry in Germany a striking object-lesson of the success achieved by the combination of business with science?

In an article in the "Monthly Review" for May, Sir Henry Roscoe quotes the opinion, communicated to him in answer to a question, of Dr. Meldola, who is Professor of Chemistry at Finsbury, upon Germany's chemical exhibit at the Paris Exhibition last year. He speaks of the exhibit as forcibly illustrating the value of the alliance of business with science, and of the originality and technical skill which are especially "fostered and developed by the German sys- "tems of education and co-operation"—the co-operation of the academy with the workshop. "No instance of this "co-operation is more striking than the discovery of the "synthesis of indigo," by Professor A. von Baeyer. The difficulties in the way of making practical use of this discovery were "great and numerous, and such as could only "be overcome by the patient application of the highest "theoretical training, combined with the most persistent "practical skill. The achievement is one of which German "industry may well be proud," but it is only one of many in the same field.

In the United States, again, the scientific expert is rightly appraised and fully employed. Mr. Carnegie, when he sent £50,000 towards the Birmingham University fund, wrote a letter to Mr. Chamberlain, in which he recalled the remark made to him by a member of the English Iron and Steel Institute, on the occasion of their visit to the States: "Mr. Carnegie, it is not your wonderful machinery, nor "even your unequalled supplies of minerals, which we have "most cause to envy. It is something worth both of these "combined; the class of scientific experts you have to "manage every department of your works. We have no "corresponding class in England." And, as Mr. Carnegie added, such a class we must sooner or later secure, if we are to remain in the first rank of manufacturing nations. The Americans do not confine their approval of sound methods of education to words. "It is estimated that a sum of no "less than £22,000,000 has been given or bequeathed by "private citizens of the United States during recent years "for the foundation and maintenance of universities and high "schools of science in that country." What have we to set against that? It is high time that our business men took in hand this question of our educational needs. Those in the House of Commons will soon have the opportunity of showing whether they realize the necessity of so doing.

Gas Companies' Disability to Trade.

THERE is a question of great moment for gas companies, which has cropped up in reference to recent parliamentary proceedings. It is as to the possible effect, by tying the hands of a gas company, in face of competition by electricity supply or otherwise, of the very common requirement that the company shall sell gas for public lighting at the lowest price charged for the time being to any consumer. This is a privilege which local authorities enjoying it will never relinquish so long as they can hang on to it by hook or by crook. Yet it is obviously an obsolete provision, demonstrably injurious to gas companies in prevailing circumstances, which did not exist in the days when it was put into Gas Acts as a reasonable concession to the public. It conflicts directly with the newer provision frequently enacted, which professedly enables gas companies to make bargains with consumers desiring supplies of gas for heating or power purposes. If this sanction has any meaning, it would surely cover such an agreement as that by reason of his taking or paying for a specified quantity of gas within a certain time, and continuing to do so, and only taking it during the hours of daylight or not later than 6 p.m. in the winter, a private consumer should be charged considerably below the ordinary lighting rate. This is precisely the sort of agreement that an electricity supply undertaking could, and would, enter into willingly—charging (say) 1d. per unit for the service, while continuing to charge three or four times as much for the public lighting. Yet, under the proviso in question, many a gas undertaking would be precluded from doing anything of the sort, in self-defence—which is doubtless the law in many cases, but is hardly justice to gas.

In dealing with the present South Metropolitan Gas Company's Bill, the Committee of the House of Commons showed their indifference to the claims of the northern Local Authorities for the maintenance in perpetuity of their actual right to a supply of gas for public lighting at an unnatural figure. So far as it goes, the action taken in this regard is a check upon the exorbitant claims of local authorities to privileges which the general body of gas consumers may pay for. It is fair for gas for public lighting to be priced at the lowest contemporary rate for any other lighting supply; but there the concession should stop. Of course, the same system of treatment would have to be extended to cover the question of the initial price in sliding-scale companies. Special agreements to supply gas for heating and fuel purposes could not be taken into consideration in fixing the rate of dividend payable. The general idea is that gas undertakings should be permitted something of the liberty of other traders in striking advantageous bargains under peculiar conditions; and if they are to be subjected to competition in their business, this freedom which their rivals enjoy cannot in fairness be denied to them.

The Case of the Extraordinary Bermondsey Gas-Meter.

Now and then the legal intellect strikes off a spark which illumines a whole waste of artificially-created difficulties in the way of every-day business. This is precisely what happened in the remarkable case of the South Metropolitan Gas Company against the Mayor and Corporation of the Borough of Bermondsey; and it is the only adequate description of the manner in which the matter was settled. The facts of the case are familiar to our readers. Owing to an exceptional arrangement of the dials of the gas-meter index,

which read hundreds in the place where the registration of thousands of cubic feet is always looked for, the old Bermondsey Vestry got off for years by paying for only one-tenth of the quantity of gas that was consumed for lighting their public baths. When the mistake was found out, and a corrected account rendered, the Vestry refused to pay. It might even be said that they laughed at the Gas Company, and told them to recover the money if they could. The rights of the matter were clearly stated by Mr. George Livesey at a meeting of the Company, when it was shown that it has never been the practice of the Company to take advantage of a consumer in the event of the meter registering incorrectly in their favour; and in this case they merely desired to be done by as they did. Difficulties, however, were raised in the way of the restoration by the Vestry of the value of the gas they had escaped paying for by so odd a chance; but the only valid one was the Statute of Limitations. This law hit the Company very hard; but they accepted the inevitable, and amended their claim to the sum that was not debarred by the Act, which was £884. Accordingly this was the amount sued for; and when the Company's Counsel had duly set forth the circumstances and asked for judgment, the learned Judge (Mr. Justice Wills) pertinently inquired, "What is the defence?" There was, and could be, none. The goods the price of which was sued for had been delivered and received, and must be paid for. Such a query confounded the defendants; and the only possible answer prevailed against all such flimsy pleas as that the Local Authority could not make or levy a retrospective rate-in-aid, that payment of the money could not be enforced, that the demand-notes must be regarded as conclusive evidence of the amount of the indebtedness, and so forth. The whole state of the case stood revealed to the light of day in this one question.

Readers of the "JOURNAL" sometimes write to us in terms that show their lack of comprehension of the law of buyer and seller in respect to gas sold by meter. The fact that the meter is merely an instrument to ascertain in the ordinary way the quantity of gas delivered to the consumer, and is not a final arbiter even of this consideration, to say nothing of other possible elements going to the rendering of a just account, is apt to be overlooked by gas officials. This is the proper character of all instrumental methods of ascertaining the bases of commercial dealings. Over and above the indications of the instrument, is the appeal to the common sense and rectitude of the parties. Again, a transaction of sale and delivery is not finished by payments being made for a commodity received. If either party subsequently discovers, within a time which is now fixed by statute, that there is any equitable reason for reopening the transaction, the Court will listen to him, and decide the matter on its merits.

The "Red Light" for the Manchester Corporation.

THE maltreatment of the supporters of the Manchester gas undertaking by the Corporation is much too serious a matter to be passed over with a brief comment in one issue of the "JOURNAL." We gave the bare facts last week; and grave enough they are to arrest the attention of the most incurious reader. Of course, everybody is not interested in the price of Manchester gas, regarded from the narrowest standpoint. That is what we meant to imply when we remarked that Manchester can please itself as to the manner in which it orders its local finances. Those who have to pay Manchester rates, and burn Manchester gas, have no option but to bear the cost of the city administration in one form or the other. Outsiders can keep away. But as an illustration of the practical operation of the much-belauded "principle" of municipal trading "at a profit," the last performance of the Manchester City Council in regard to their gas consumers is not to be lightly dismissed as a local affair. By a mere vote, the Council ordered their Gas Committee to raise a "profit" balance of £50,000 for the year out of the undertaking, which necessitated the clapping on of an additional charge of 3d. per 1000 cubic feet. At a later sitting, the Council refused to issue any similar instruction to the Electricity Committee. Both undertakings, as a matter of fact, have been skinned to the bone for the sake of the insatiable ratepayer. Neither has any reserve fund worth speaking of, to keep the occasional and accidental wolf from the door.

Why were the Manchester City Council averse to charging the users of municipal electricity something more, to help the rates? Was it out of any special consideration for the poor people who as a rule use electricity? Not at all. It was simply and solely because they were afraid of letting in outside competition. Manchester has "seen the red "light" in the shape of electricity supply-in-bulk schemes; and Manchester knows that Parliament would not hesitate for a moment in letting in a competing supply, if it could be shown that the Corporation do not use their present powers for the purpose of giving the people the benefit of the best and cheapest supply, but as a source of additional municipal revenue. The Corporation think, in their blindness, that they are safe to do as they like to the helpless gas consumer. It will be a healthy corrective to those members of the Corporation who are of this way of thinking, to take to heart the lesson of the Mond Gas Bill. If this Bill should become an Act, how long would it be before the appearance on the horizon of a Lancashire Mond Gas Bill, a Yorkshire Mond Gas Bill—any number of Mond Gas or other fuel-gas Bills? And what could possibly constitute a better invitation for such a venture into Manchester than the recent vote of the Corporation in favour of taxing the gas consumer to squeeze out another £50,000 a year? To characterize a Manchester District Mond Gas Bill as competing with the Corporation gas supply, would be its best recommendation to Parliament. Competition, that is to say, is precisely what the Manchester Corporation need to keep them within the bounds of fair trading. It is a lamentable conclusion, but there is no escape from it.

The Parliamentary Victory of the Golborne Gas Company.

A VERY interesting contest has been brought to a satisfactory conclusion by the parliamentary victory of the Golborne Gas Company over the Leigh Corporation. The Golborne Company are promoting an Incorporating Bill; the undertaking having been hitherto carried on by a Limited Company. It so happened, however, that so long ago as 1861 the then neighbouring Leigh Gas Company obtained statutory powers which included Golborne. Nobody at the time, nor for a long while after, thought that this meant anything at all as regards Golborne, which was three or four miles away from the nearest Leigh gas-main. But urban districts have a way of extending in an unpremeditated manner, however; and in the case of Leigh, the extension was in the direction of Golborne. The Leigh gas undertaking, moreover, became the property of the Leigh Corporation, with all the statutory rights and privileges, which included the unexercised claim to supply Golborne. The sequel shows the mischief of these statutory privileges to which no time limitation is attached. Although the Leigh Gas Act had, as regards Golborne, remained in abeyance for forty years, no sooner was there a sound of the Golborne Company coming to Parliament for incorporation, with the necessary rectification of the Leigh Act of 1861, than the Corporation decided to oppose the Bill and exercise their own powers. The result will be found fully recorded in our report which will be given next week. For the only occasion of the sort in the modern history of gas supply in England, a competitive gas supply was set up in an Englsih town district—this by a Municipal Corporation, at the expense of a little neighbouring Gas Company. It is an exhibition of municipal greediness, which could clearly lead to nothing else, in the first place, than a bitter parliamentary conflict. So the Chairman of the Committee seemed to think. He gave the Golborne Gas Company the *status* of the sole gas-supplying body in Golborne, and fastened upon the Leigh Corporation the stigma of being "filibusters." A pretty name indeed to call a municipal trader! The Committee accordingly passed the preamble of the Bill, declaring in set terms that the Leigh Corporation were unworthy of the slightest consideration; and with this mark against them, the Corporation must go to the Upper House for such comfort as they may hope to receive.

Some Mond Delusions.

IT is not our intention to discuss in detail the merits of the Mond Gas Bill, which, to the surprise of most of the parties concerned, passed the House of Commons Committee without substantial change. In the interests of the gas industry of the United Kingdom, however, we desire to register a protest and a warning against the misleading way in which the scheme embodied in the Bill is being puffed all over the country by the newspapers—of course, on their own initiative. We do not care to complain of the personal adulation bestowed upon Dr. Ludwig Mond, who is currently praised for his great invention, and for his patriotic endeavours on

behalf of British manufactures in general, and the trades of the South Staffordshire Black Country in particular. As for the vapourings of the Newspaper Press, which never heard of Mond gas before yesterday, this is a case of illustrating the old saying, "*Omne ignotum pro magnifico*." But what we do object to is the staring head-lines, announcing "Gas at 2d. per 1000 cubic feet," which have been seen in most newspapers during the past fortnight. True, some of the brief notices of the Mond scheme which follow these announcements are sufficiently well informed to declare that Mond gas is subject to a particular limitation, and is in this respect similar to Monkey Brand soap. The one commodity will not do for lighting, precisely as the other will not wash clothes.

Some artless newspaper writers wonder why this limitation is made so much of; while others, endowed with slight technical knowledge, marvel that a fuel which is competent to weld metal cannot be made to show a light on occasion. As a rule, however, it is the simple advertisement of the possibility of any sort of combustible gas being sold at 2d. per 1000 cubic feet that prejudices the reputation of established gas companies. Gas is gas, to the "man in the street." He and most of his faithful representatives who write professionally for the papers, know nothing whatever about British thermal units. They would not recognize a thermal unit if they saw one in a cage. That is the annoying feature of this newspaper booming of Mond gas, by persons who know but little about it, only that the ordinary gas is very much more highly priced. Observe, the circumstance that the Mond Company propose to pay a 10 per cent. dividend on the whole of their capital—just like any other gas company, only more so—does not weigh at all with these applauders of the new enterprise. Sell gas at 2d. per 1000 cubic feet, and you can have anything you like for yourself—that is the moral of the situation; and it is not the least instructive point about it.

England at the Paris Exhibition.

It may probably be taken for a fact that the Paris Exhibition was the last occasion of the kind at which the British Government, and British exhibitors, will figure on the old footing. The report of the Royal Commission on the Exhibition, issued last week, renders this conclusion inevitable. The language of the report is very much to the point; and it clearly shows why the British Industrial Section of the Exhibition was not a fair representation of the best of the industry of the country. Most of the really first-class firms stayed away, not seeing any attraction to warrant the great trouble and expense to which they would have been put by anything like adequate representation. Besides, they were too busy, and did not want the advertisement. The result was that the available space was occupied by minor firms, who wished to push themselves to the front. They did pretty well; but naturally their unassisted efforts, sometimes crippled by small means, could not compare effectively with the subsidized displays of various Continental firms. And this consideration brings the Commissioners to a point on which the public generally have already felt keenly. It is that the English Government have not regarded their part in respect to these foreign exhibitions from the same standpoint as other Governments. Whereas the latter have regarded exhibitions as good occasions for advertising the capabilities of their country's manufacturers, whom they have accordingly assisted with money and otherwise to make effective use of them, the English Government has never stirred a finger to help a British trader, either at an exhibition or in any other way. The British subsidy granted to the Paris Exhibition Commissioners, it will be remembered, was chiefly spent upon the building and furnishing of the Royal Pavilion in the grounds, which was principally used by the eminent personages of the Diplomatic Service, and others, for entertainments. The Commissioners now plainly tell Parliament that this farcical way of "assisting" at foreign exhibitions must be dropped. The foreigner acts differently; and unless we are prepared to play the game in his manner, he being in the majority when at home, we had better give it up altogether. In this judgment all British visitors to the Paris Exhibition will heartily concur. The whole performance in connection with the so-called Royal Pavilion was a crying scandal; and if the subject is not raised in Parliament on the vote for somebody's salary, the plain story should be remembered in case it is ever needed to stop future foolery and snobbery of the same order. The English Royal Pavilion at the Exhibition may have been useful in a way, as illustrating to the foreigner the lofty indifference with which the British Diplomatic Service habitually treats Englishmen resident or travelling abroad; but symbols of national weaknesses are not fitting objects for national expenditure.

WATER AFFAIRS.

The London County Council and the Sterilization Clause.

The authorities whose seat of government is at Spring Gardens are fond of displaying on every possible occasion their characteristic quality of fussiness, but apparently never with more satisfaction to themselves and less utility to the public than when the objects of their special attention are the affairs of the London Gas and Water Companies. The "custodians of the ratepayers' interests" do not appear to consider expense in these matters. If they can only show that the gas has been half-a-candle below the standard, or that the water on certain days has not been quite up to its usual quality—though no one may have been "a penny the "worse" in consequence—they do not hesitate to spend money freely in detecting and punishing the offenders. An instance of this interference occurred last week. Some of our readers may remember that in the Staines Reservoirs Act of 1896 provision was made that if the undertaking of any of the three Companies constituting the Joint Committee for carrying out the works should be purchased, otherwise than by agreement, within seven years of the passing of the Act, by any public body or trustees, no claim was to be made in respect of any advantages conferred by the Act. This provision—commonly known as the "sterilization clause"—was included in an Act obtained by the Committee two years later. As the clause would lapse in 1903, and no purchase scheme had been sanctioned, the County Council became alarmed lest one might not be completed before that date; and they accordingly applied to Parliament to have the two Acts referred to amended so as to extend to 1906 the "sterilization" period.

The Bill to effect this object came on Thursday before a Select Committee presided over by Sir Henry Fletcher. The proposition was, of course, opposed by the Joint Committee, who urged through their Counsel (Mr. Pope) that the clause was only intended to operate while the works were in course of construction, after which time the sinking-fund clause, which had been specially framed for the benefit of the future purchasers, would come into force, and the City Chamberlain's fund would increase in consequence. Moreover, though the extension applied for would not affect the property of the debenture-holders, with whose money the works are being constructed, it would have a detrimental effect upon the market price of the stock. For the Council, Mr. Freeman contended that the prolongation of the operation of the clause was required to safeguard the ratepayers; and, further, the amendment proposed would make the period accord with that at which a similar provision in the Metropolis Water Act, 1899, would expire. Mr. M'Kinnon Wood, the Chairman of the Water Committee of the Council, gave evidence in support of the application; and Mr. H. L. Cripps, their Parliamentary Agent, who drafted the clause when it first became a feature of water legislation for the Metropolis, told the Committee that he understood it was to be in force for the period specified in the Act, irrespective of the completion of the works. No witnesses were called for the petitioners against the Bill; and, after a short deliberation, the Committee passed the preamble.

We fail to see that the application was urgently called for, inasmuch as the President of the Local Government Board had the question of the possible expiration of the "steriliza-"tion" period before purchase could be effected brought before him by the deputation from the County Council who waited upon him towards the close of last year; and though he recognized that the matter would have to be dealt with, he was careful not to pledge himself as to the action he would take. We think the solution of the difficulty might well have been left in his hands, to be arranged in the Bill he has promised to introduce next session. Such a restriction as that imposed by this clause has never, as Mr. Pope pointed out, been applied to any other industry in the country; and its extension inflicts injustice upon the three Companies concerned, inasmuch as they will be subject to this restriction and to the operation of the sinking-fund clause at the same time. All that can be said for the Bill is that it brings

the clause in the two Acts in question into line, in point of its period of operation, with that contained in the Government Act of two years ago; and this consideration may possibly have influenced the Committee's decision.

Sanitation and Water Supply at Windsor.

In the "JOURNAL" for the 9th of October last, reference was made to the insanitary condition of Windsor, as revealed by a report submitted to the Local Government Board by Dr. H. Timbrell Bulstrode, who had been specially sent down to inquire as to the truth of representations which had been made that certain objectionable features to which attention had been called as long ago as 1887 and 1889 by Dr. Airy and Mr. Arnold Taylor still existed. The result was a condemnation of the Sanitary Authority for displaying "too "much indecision" in dealing with matters which seriously affect the health of the inhabitants of a town. In noticing the report at the time, we remarked that no complaint whatever was made in regard to the water supply; and we are now pleased to find that the statement is borne out by Dr. Bulstrode's report, which forms one of the appendices to the report of the Medical Officer of the Local Government Board (Mr. W. H. Power, F.R.S.) issued last week. The shallow wells from which the town was supplied many years ago have almost entirely disappeared, and the water is obtained from the works constructed by the Windsor and Eton Water Company, which were acquired by the Corporation of the Royal Borough in 1884. The existing wells, on Tangier Island, which are from 26 to 28 feet deep (the greater portion of this depth being sunk in the river gravel, which overlies the chalk), afford a supply of water sufficient for the needs of the district; the quantity sent out daily being at the rate of something like 35 gallons per head of the population. The quality of the water has been shown by analyses to be favourable; and though a portion of the entire bulk may be river water, and subsoil water passing down the valley of the Thames, Dr. Bulstrode points out that the former, when filtered through the gravel in this neighbourhood, undergoes very material improvement. This fact was noted in the section of the Sixth Report of the Rivers Pollution Commissioners dealing with the water supply of the Royal residences. The Castle, however, receives its supply mainly from its own works near Romney.

The weak point in the Windsor system appears to be an absence of storage—the water being pumped direct into the mains. It is recognized that this would be a serious matter in the event of a fire, and consequently it is having attention. It speaks well for the quality of the water that no filtration is considered necessary. The water is chemically examined every quarter, and the Medical Officer of Health is notified of the date and place at which the samples are taken. It has been the practice to draw them from the mains in the town; but Dr. Bulstrode thinks that, having regard to the fact that the water is delivered from four wells in different positions, it is desirable to periodically examine some taken from each separately. A course such as this would be more likely than the present system to indicate any danger to which the water of a well might be liable. Amid much that called for reform in connection with the sanitary arrangements of the borough, it is gratifying to find that the water supply, provided in the first place by private enterprise, has not, in the hands of the Corporation, been allowed to get into such a condition as to give rise to criticism. Whatever slackness there may have been in the past on the part of some of the officials, those who are responsible for the water service are keenly alive to what is necessary for ensuring its efficiency on the score alike of quality and quantity. It is not inopportune, now that very considerable alterations are being made in the Castle with the view to its better utilization as a Royal residence, to state this fact, and also to record that many of the defects which called forth Dr. Bulstrode's criticisms have already been acted upon, as he frankly acknowledges in a postscript to his report.

Reference has already been made to the gift, by Mr. Henry C. Rew, of Chicago, whose name is known to our readers in connection with his water-gas process, of a public library to Newark, New Jersey, as a memorial of his parents. The building, upon which the generous donor has spent $25,000, was formally presented to the village on the 9th ult., in the presence of a distinguished company. The following evening, Mr. Rew was entertained at a banquet in the Sherman Opera House, under the auspices of the Newark Chamber of Commerce.

ESSAYS AND REVIEWS.

TRADERS IN CONFERENCE.

As so much is said on occasion, and more thought but left unuttered, on the question of the inclusion of "traders" in the membership of technical societies connected with the gas industry, it may not be lost labour to study the "trader" as he appears when conducting a public gathering of his own. The trouble about traders in connection with meetings of technical associations has arisen wholly and solely from one particular source, the nature of which is perfectly well known to everybody concerned, although misrepresentations in regard to it are not lacking. It is not, as the commonest misstatement in this regard pretends, that the professional man, who attends society meetings for their technical interest, looks down on the commercial gentlemen with whom he may be compelled to rub shoulders on these occasions if they are admitted to them. The truth of the matter is that he suspects the motive which brings the commercial gentlemen there, and that painful experience of a few of them and of their behaviour turns the suspicion in these instances into conviction. In short, whatever the nature and the strength of the technical bond which in a sense unites the mere trader to a society devoted to the advancement of a particular industry, and makes him eligible for full or partial membership under the rules, some of their number cannot or will not drop the bagman or the shopkeeper, but persist in forcing every occasion to their own trade advantage. This would render their presence objectionable, even if their methods of pushing business were inoffensive; but inasmuch as the opposite quality usually characterises the operations of the most active and persistent of this sort of "traders," it is not to be wondered at that their room is preferred to their company by those who are not out shopping.

Recently a capital opportunity for taking account of the trader when he had momentarily divested himself of his apron, and left his bag of samples in the cloak-room, so to speak, was offered by the Ironmongers' Federated Association Conference held in Birmingham. Here were traders, meeting together as such, to openly confute the slanderous proverb which asserts that "two of a trade can never agree," and to concert measures for their own protection and for the confusion of their enemies. The detail that among the latter are officially included all gas undertakings that let out gas-stoves on hire, and some manufacturers of such goods who also have retail shops of their own in sundry places, lends a spice of particular interest to the proceedings of the conference which would otherwise be lacking. Attentive perusal of the report of the proceedings in the faithful "Ironmonger," gives rise to many reflections. The first may be given in the question, What is an ironmonger? We have on several occasions made the same inquiry. Originally, he appears to one's memory as a usually well-to-do shopkeeper who wore a black apron, stocked hardware, and kept a workshop for jobs of black and white smithing. Time has changed all that. Nowadays he deals in ironmongery, and anything else he can lay hold of. The energies not fully exercised in putting fingers into other traders' pies, are expended in protests against infringements by other people of his own asserted commercial privileges. Thus, at the Birmingham meeting, support was largely given to the provisions of a Bill to enable other traders than "chemists" to sell certain poisons, such as sheep-dip, weed-killers, and arsenical paints. The majority of the meeting seemed quite surprised when one of their number reminded them that a gathering convened to defend the rights of one order of tradesmen could scarcely with a good grace attack the legitimate commerce of another. Altogether, the assembled ironmongers betrayed a good deal of human nature in this respect.

The gas industry as a whole, whether municipalized or not, has no great cause to love ironmongers. It is one of the pet grievances of the "trade" against gas undertakings, that the latter have robbed them of what they are pleased to call their rights to deal in gas cooking-stoves, gas-fires, and sometimes of all descriptions of gas consumers' internal fittings. They complain of the impossibility of doing business in this class of goods in towns where the gas company or the municipal gas department lend gas-stoves on hire. It ought to be a complete answer to this allegation to remind the ironmongers that they never had the trade which they assert has been taken from them. Those whose memory runs back to the period before gas undertakings generally adopted the policy of hiring-out gas-stoves, do not need to be reminded of the trashy goods that represented the shopkeepers' ideas of what these articles should be like. The traders were not wholly to blame for this. They had to make what would sell; and this meant necessarily a cheap article, like the ordinary run of oil-stoves which they still retail. It was only when the gas companies decided to put capital into gas-stoves for hiring out, that manufacturers of these articles improved them in the direction of durability. The gas company, in other words, performed the service of removing the gas-stove from the category of tenants' fittings, usually temporary, and placed it with the landlord's grates and kitcheners, as something for the tenant's use, but not to possess. No mere shopkeeper could have effected this change of the very *status* of the gas-stove, which entailed so radical an alteration of its structural character.

The addition of this branch to the ordinary responsibilities of

a statutory gas undertaking, has not been an unmixed benefit to anybody concerned; and there are few gas managers who would not be extremely glad to be relieved of the care of it. It has precipitated the standardization of stove patterns, and thereby arrested improvement. It is not expedient for a public body to sink money in too many slightly-differing patterns of a hired-out article; yet all experience teaches that improvement of appliances in common use only proceeds by small, almost insignificant steps. The play of individual fancy is one of the chief forces that make for progress in the manufacturing arts; and this force is stayed by standardization. There are, besides, other drawbacks to the existing compulsory system, which need not be gone into here. Nothing better is to be hoped for, so it is wisdom to make the best of what exists.

With regard to the dealing in water and electric fittings, which municipalities have largely taken out of the ironmongers' hands, it is to be feared that the trade have deserved their fate. While the pocketing of his trade discount remains the shopkeepers' chief solicitude (and this care ran through all the talk at the conference), he is obviously not to be trusted to stock fittings intended for use—not merely to sell. In the matter of ornamental gas-fittings, a different order of consideration prevails. The trade in these should, as the Board of Trade allow, be left in the hands of the private shopkeeper. But here again the greed of the trade discount pursues him. Where a shopkeeper stocks an ample and well-selected variety of goods, so that the public resort to his show-rooms in the confident expectation of getting suited, he clearly deserves his retailer's profit. It is difficult to see, however, where his deserts lie when he does not stock the goods at all, but merely passes a possible purchaser on to a wholesale dealer. In many cases it is the manufacturer who is expected to keep the stock, with all that this entails; and the ironmonger will claim 50 per cent. discount for sending a customer to select from it.

Of course, this fine old crusted imposition is getting cleared away, not by a natural and easy process, but by a subterranean movement of revolt. The manufacturers are doing business directly with the public, at their own prices; and small blame to them. The revolution that changed the face of the retail shopkeeping world when the Co-operative Stores broke in upon their grasping profits—profits, by the way, out of which the individual shopkeeper was still frequently unable to live—has another turn to make before it comes full circle. The ironmonger must realize, together with the bootseller, the tobacconist, the slop clothing dealer, and the rest, that trade discounts must be earned if they are to be realized. The middleman must justify his existence, or disappear. He has to be useful, or make way for somebody who is. Perhaps if ironmongers ceased to spread themselves so much—leaving house agency and the sale of weed-killers to those who know about such things—and went in more exclusively and more thoroughly for ironmongering, they would find it to their advantage. The lack of concentration on the part of the modern tradesman is not compensated for by his perfunctory universality. The complete ironmonger, who knew nothing else beyond his trade, but was master of that, is but poorly represented by the shopkeeper who knows nothing but will sell everything that offers an enticing trade discount.

What is wanted, in fact, is the restoration of the ancient identification of the tradesman, in the technical sense of the word, with the shopkeeper. The mere discount hunter, like the underseller, is found out in the long run. Although the casual passer-by may step in and buy an article that strikes his fancy, the local resident, by whom the shopkeeper must live, will discover the tradesman who really knows his business, and patronize him. As for the latest complaint of the associated ironmongers—the direct supply of goods by manufacturers to consumers—it is idle to kick against the growth of a system which modern facilities for the distribution of commodities have brought into favour. Why should ironmongers be heard against a fashion which poulterers, fishmongers, and dairymen must endure as best they may? If the ironmonger were wise, he would make the direct-trading system his friend, by offering to act as an intermediary between the ignorant buyer and the enterprising manufacturer. One can imagine a smart ironmonger saying to his public: "Do not send money and orders to people you know nothing of, for goods you have never seen. Send your commissions to me, and I will execute them for you without charge. I will get the goods in; and if you do not like them, you need not take them." The usual 2½ per cent. cash discount would pay for this business, if no better terms could be made. According to the report of the Birmingham conference, it will be long ere the associated ironmongers take this broad view of their functions as middlemen.

Beside this question of direct trading by manufacturers, the protest of the federated ironmongers against municipal trading was a trifling matter. Ironmongers are not singular in viewing with apprehension the prospect of an unlimited and unregulated extension of municipal trading. Happily, however, the danger of such extension is not pressing. As the President of the conference wisely observed—and as some of the ignorant newspaper partisans of the "principle" of municipal trading would do well to learn—the most remarkable extensions of this kind of communal enterprise are not to be found in the highly civilized and organized communities of the West of Europe, but have long been operative in some of the most backward of European countries. Municipal pawnshops, savings banks, hospitals, medical dispensaries, theatres, balls, horse races—all sorts of variants on the old theme *panem et circenses*, are in evidence on the Continent; but the communities where these things are to be found are not usually ranked among the foremost in the race of civilization. A small Italian town may be innocent of drainage; but it will have thirty or forty *festas* a year, with processions and shows paid for and organized by the *Municipio;* and seeing that the populace know nothing and care less about drainage, while they certainly do care very much for making holiday, who shall say that, after the doctrine "the greatest good for the greatest number," their rulers are not justified?

Lastly, we would not be misunderstood as seeking to cast any reproach, even the lightest, upon the doings of the federated ironmongers in Birmingham. It was a very good traders' meeting, and was thoroughly well conducted in every sense. If the members failed to make it quite clear to an observant universe why the ironmonger ought always to have his trade discount, and a bigger one than anybody else, on such trifles as screws, &c., while doing no more to earn it, the fault doubtless lies with the dense outsider. The same observation applies to the laudable ambition of ironmongers to sell carbolic acid, which is, obviously, quite in their way. It was a very successful function, and the gaiety of nations would suffer a noticeable eclipse if such gatherings were to go out of fashion.

THE VALUE OF RESEARCH.

THE Presidential Address delivered last Wednesday week by Mr. William Whitwell, before the annual meeting of the Iron and Steel Institute, contains much of interest to those engaged in other industries than those to whose representatives it was addressed. The President very rightly laid stress upon the value of research to all industries in which practice is more or less founded upon scientific principles and theories. The practical man is apt to ignore or minimize the value of the student; and it is well that he should be reminded of the debt he owes to, and the benefit he may derive from, the investigations of the scientist. "The Saniter desulphurizing process, by which thousands of tons of good steel have been made from pig iron, quite unfit if used without the desulphurizer, was founded on pure laboratory experiments conducted by Saniter himself. . . . In the 'Iron Age' for Dec. 20, 1900, there was given an account of some radical changes in the arrangements of the Edgar-Thomson Steel-Works of the Carnegie Company . . . to introduce a new method of rolling rails, founded on the facts brought to light by the researches on heat treatment. The work of Hadfield on the effect of manganese produced that wonderfully useful material, manganese steel. Many more illustrations of the value of research work . . . might be given."

This insistence on the necessity for and value of the scientific study by trained investigators of the theories upon which practice is founded, led naturally, though not immediately, to a consideration of the subject of technical education, by means of which the numbers of those capable of conducting investigations, and of those fitted to employ profitably in practice the results of those researches, may be increased. Mr. Whitwell dwelt chiefly upon the question as to whether we are using such technical education as has been acquired by our employees to the best advantage, or whether we are "letting much of it go to waste, and the mental abilities of our staff to rust." The suggestion he has to make, or rather to endorse, is that in all free libraries there should be a "technical department," containing the standard works on the particular industries followed in the town, or, better still, that all our big works should possess a library of standard books on the manufacture there carried on; such libraries to be supplied with all the periodicals and reviews (both home and foreign) bearing upon the industry, and with copies of the proceedings of any technical societies connected therewith. Members of the staff should then be encouraged to study these books, and especially the current literature, and to call the attention of the authorities to any description of machinery, processes, or methods of working which may appear to them superior to those in use at their works. The heads of a big business cannot belong to, nor if they were members could they attend the meetings of, all the technical societies; they cannot find time to read all the journals, both home and foreign; "and the result is that many useful papers full of information are lost to thousands to whom they would be of the greatest use." The plan here indicated is well worth the consideration of those responsible for the administration of our larger gas-works. How many of those administrators carefully digest all the mass of technical information contained in the pages of the "JOURNAL"—a mass that seems to grow from year to year?

Elsewhere in his address, Mr. Whitwell gave some most interesting particulars relating to the quantity of heat wasted in blast-furnace working, and to what has been done, and remains to be done, in the direction of utilizing the waste bye-products of these furnaces. The latter subject was dealt with in the columns of the "JOURNAL" for Dec. 25 last; and the progress then made was reviewed at some length. One of the most serious difficulties in the way of utilizing blast-furnace gases, it was then remarked, is the amount of dust they contain; and it is of considerable interest to note that, in a paper upon the subject contributed to the Iron and Steel Institute, M. Adolphe Greiner

of Seraing, after describing two methods of removing the dust from the gas, stated that "facts have shown that the cleansing of blast-furnace gas can be effected by simple and economical means," and that "no reason exists why the principle should not be carried further, and the gases cleaned before use in the blast-heating stoves or boiler flues. . . . a new advance in furnace management."

Speaking of the Cleveland district only, Mr. Whitwell calculates that, in spite of the extent to which the furnace gases are at present used, horse power equivalent to that produced by the consumption of over 500,000 tons of coal is annually wasted; while the heat wasted in the iron and slag produced is equal to nearly another 300,000 tons of coal per annum. "It would," he says, "be impossible to recover all this waste heat and apply it to some useful purpose; but a large proportion of it should be reclaimed." And he suggests that the researches of the metallurgists, and the efforts of the engineers engaged in the iron-making industry, might with profit be directed to the solving of this problem. It is certainly one of the fields of research that may well be most fruitful in the coming years—that of how to obtain from every ton of coal we take from stock (never to be replaced) the highest possible amount of work. Every consumer of coal will wish success to those who labour in this field.

The only other point in Mr. Whitwell's most interesting address that we can notice here, is his intimation that attempts are now being made to extract the potassium cyanide contained in blast-furnace fumes, by inserting tubes to draw off those fumes and then condensing and collecting the cyanide. "Should this prove successful, it will become a valuable bye-product," says Mr. Whitwell; and we would merely add, "unless it shares the fate of other bye-products, and be produced in such quantities as to greatly diminish its market value."

THE INCIDENCE OF TAXATION.

In the current number of the "Contemporary Review" is a brief but effective article by Mr. Joseph Ackland, on "The Revolution in the Incidence of Taxation," in which is brought out very clearly the point, to which attention has been called on more than one occasion in the "JOURNAL," that the tendency of taxation in recent years has been to throw an ever-increasing burden upon the income-tax payers, and especially upon those possessing incomes under £1000 a year. As Mr. Ackland points out, the great increase of taxation which the country has to bear renders it more than ever important that the burden should be distributed in an equitable manner; but unfortunately the increase has only been accompanied by an aggravation of the previously existing inequity.

The income-tax was originally a war-tax, pure and simple. It was revived, as a temporary measure, to tide over the period of transition from Protection to Free Trade. That transition period over, and the cost of the Crimean War and the Indian Mutiny liquidated, Mr. Gladstone (who had always treated it as a temporary expedient), in 1874, "proposed to redeem his promises, and abolish the tax," which then stood at 3d. in the pound. The electors, however, did not return Mr. Gladstone to power; and "since then a silent revolution has progressed, which has steadily increased the proportion of the burden of taxation falling upon income-tax payers, and lessened the proportion falling on all other classes." The following figures from a table drawn up by Mr. Ackland show the progress of that revolution:—

Year ended March 31.	Direct Taxation. (per cent. of Total Taxation). Income-Tax.	Other Direct Taxes.	Total.	Indirect Taxation. (per cent. of Total Taxation).
1876 . .	6·28 ..	26·05 ..	32·33 ..	67·67
1881 . .	15·23 ..	26·10 ..	41·33 ..	58·67
1891 . .	18·02 ..	22·11 ..	40·13 ..	59·87
1901 . .	22·80 ..	22·76 ..	45·56 ..	54·44
1902 . .	27·66 ..	20·46 ..	48·12 ..	51·88

When it is borne in mind that the income-tax paying section of the community is only about one-eighth of the whole, that 96 per cent. of those paying income-tax are assessed at not more than £1000 a year, and that upon that class falls a large part of the indirect taxation, the injustice is seen to be a heavy one. What makes it more aggravating than ever (to the teetotaller, especially) is the fact that the percentage of taxation placed upon intoxicants has considerably diminished in the past quarter-of-a-century. While the total taxation has risen in that period from £65,000,000 to £111,000,000 (the latter figure is for the financial year last ended), and the income-tax from £4,000,000 to £25,000,000 per annum, the tax on intoxicants has only increased from £31,000,000 to £41,000,000, a rate of increase only equal to that of the population. With the income-tax at 1s. 2d. in the pound, the fact that this form of taxation violates, so soon as it becomes considerable, the third of the four general principles of taxation laid down by Adam Smith in his "Wealth of Nations," will become more than formerly apparent. The principle referred to is that "every tax ought to be levied at the time, or in the manner, in which it is most likely to be convenient for the contributor to pay it;" whereas, as Mr. Ackland points out, "the income-tax, by demanding the whole year's payment in one sum, takes the money by the most inconvenient method possible." In the case of a man receiving an annual salary of £1000 in monthly instalments, it is obviously the least possible convenient method for him of paying his share of taxation to have to hand over £58 6s. 8d. in one lump sum to the collector. Mr. Ackland's conclusion may well be quoted at length:—

> These tendencies to unequal distribution of the burdens of taxation ought not to be treated as unimportant; they are fraught with very serious possibilities of disturbance to the stability of the Nation. In the middle of the last century, franchise reformers demanded that there should be no taxation without representation. If this drift continues, by the middle of the present century, fiscal reformers will demand that there shall be no representation without taxation. It is doubtless a peril to the community to have at one end of the social system an hereditary hierarchy, legislating without responsibility to the electorate; it would be equally perilous to have at the other end a demoralized democracy, legislating without responsibility to the tax collector.

With that conclusion we are in general agreement. The difficulty of bringing "responsibility to the tax collector" home to the poorest section of the electorate, appears to us, however, not to be capable of being diminished greatly by the increase of indirect taxation, so much of which is borne unconsciously. That is, of course, not an argument against the needed extension of indirect taxation, but merely a reminder that such an extension would not have the same political effect as the imposition of direct taxation upon (say) all incomes exceeding £50 a year. Under our present system, the man earning £3 a week, living in a house or tenement on which all rates and taxes are paid by the landlord, rarely is aware of any "responsibility to the tax collector," be the indirect taxation he pays never so heavy.

ELECTRIC LIGHTING MEMORANDA.

Parliament and Electricity Generation in Bulk—The Decisions of the Committees—The Conditions of Commercial Success—Doubts and Difficulties.

PARLIAMENTARY Committees have been very busy during the last few weeks in disposing of the numerous electricity-in-bulk generation schemes which the enterprise of sundry groups of speculators has launched, in the expectation of turning an honest penny out of share dealings before the fashion in such things dies out. This must be the real motive underlying these different schemes; for they have all been rushed forward without waiting for the experience of the pioneer undertakings of the same order sanctioned last year. Probably the promoters are wise in thus anticipating the verdict of history; for there are those—and the "JOURNAL" is of the number—who are sincerely sceptical as to the financial prospects of the new departure in electricity supply. However this may be, a good many companies have this year sought parliamentary powers for putting the question to the test. The banks of the Clyde were selected for the hunting ground of two rival Companies—the Clyde Valley and the Caledonian Electric Power Company. Most of the burghs of the district strongly objected to both schemes as unwarrantable and superfluous interference with the arrangements of the local authorities; and in the event, the Committee threw out the Caledonian Company's Bill, and passed the preamble of the other with the excision of Port Glasgow, Govan, Partick, Paisley, and Hamilton. Whether what remains to the Company is worth going to Parliament for, is so more than doubtful that the Company are not likely to be heard of again.

The Derbyshire and Nottinghamshire Electric Power Bill is another of these measures. It is the second for the same area; a Bill having been promoted in 1898 by a group of American speculators. The present Bill had the advantage of influential local support; the list containing the names of some 400 firms, representing a capital of 20 millions. It was given in evidence that the Company would be able to generate and supply electricity more cheaply than small public or private plants; and the Committee passed the preamble without qualification. The Cleveland and Durham County Bill was equally fortunate, subject to certain provisions protecting established undertakings with a good character. Two Yorkshire Bills were considered last week. It appears from all this that there is no lack of opportunity for the friends of this kind of electrical enterprise to go ahead and show what they can do. Meanwhile, to all possible investors in such schemes, we counsel the exercise of the greatest caution. The nature of the proposal is essentially interesting; and it would be a pity if undue timidity on the part of British capital were to prevent the plan from having a full and fair trial in some really favourable parts of the country.

The idea of the generation of something at the pit's mouth by the heat of the cheap coal presumably to be had there—gas, or, as in the present instance, electricity—is a very fascinating one. It has occurred to many; and now it looks as though a crucial experiment upon the whole notion were about to be tried. It is impossible to believe, however, that all the schemes of the kind actually proposed can be commercially successful. Their circumstances and dispositions are so various that the very conditions which seem to offer a hope of success to a few are entirely lacking to others. The great difference lies in the nature of the business to be done. An electricity-in-bulk generation and supply concern can either look to find a market with established electrical installations, or must hope to create a demand out of the void. Paradoxical as it may appear, it is more probable that

such a concern will be able to live in a region already abundantly supplied with electricity by isolated plants, than in a new country destitute of these establishments.

This conclusion is deducible from premisses that appear to be of general validity. Where a neighbourhood is actually doing without a public electricity supply, the presumption is that such a service is not greatly needed. A demand may be created; but it can only come with time, which means waiting for the trade. On the other hand, where there is already a brisk demand for electricity for all purposes, there will be an increase to provide for immediately; and if electricity in bulk is good for anything at all, it should be able to supply this increase straightway at an advantage to the purchasers. The commercial prospects of all these big schemes rest upon no better foundation. Where there are public or private electric light, electric tramways, electric mining or milling, there the new kind of supply will certainly find the best market—at a price. The only pertinent question therefore is: Will such an undertaking be able to do the business at the price which the possible purchasers can afford to pay? Candidly, the chance strikes us as a thin one. In the first place, the comparison of cost will be, not with the existing average cost of the purchaser's own supply, but with that at which he can provide himself with more of it. Obviously, this cost will be a reduction on the existing average, because it will usually be free from the original standing charges. If a local electric lighting undertaking, for example, has a high capital investment per kilowatt of generating power, it will usually prefer to make good its own extension until this figure is brought within bounds. Meanwhile, the big company with power to sell must wait outside. When at length it is called in, the first demand will only be for so much current as will carry the local works over the peak of the daily load. If there are forty such local installations in the district, they will all act in the same way. This is not precisely the class of business that a big outlying undertaking would elect to do at a cheap rate; but the charge will have to be low, or there will be no trade, even under these conditions. A very active development of electric tramways, where there are people to use them, will probably be the solution of such of these electricity-in-bulk generating ventures as live through the first five years after their establishment.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1401.)

In the Stock Exchange last week, all eyes were naturally directed to the American Market and the effects of the storm raised there in the preceding week. Everyone was full of apprehension. But at present things have got along pretty well, and only one or two little craft have gone down in the troubled waters, though the list of casualties may be swelled before all subsides. Away from the immediate area of disturbance, there was a better feeling; and some departments are decidedly stronger. The settlement was a very big affair; and the cheques through the clearing house on Thursday totalled £109,000,000—an increase of nearly 30 per cent. on the previous record. In the Money Market, the demand was acute. But it was met without difficulty; and the Market closed very easy. Business in the Gas Market was, on the whole, decidedly light, and had it not been for unusually large dealing in South Metropolitans, it would have been of extremely small proportions. The prevailing tendency was fairly firm; but some leading issues show a reduction, which may be assigned to special causes. In Gaslight issues, the ordinary opened no stronger than it was at the close of the previous week, and was lightly dealt in at about the same figures throughout the week—the quotation falling a point at the end. The secured issues, too, were weak, and the debenture stock fell a point. This was probably due to the persistent hostility evinced towards the Company in the course of the passing through the House of Commons Committee of the South Metropolitan Bill. As regards South Metropolitan ordinary, this same successful passage had the effect of sending the quotation down five points because the capital is to be increased! One could rather have expected such a fall if the capital needed to meet the ever-increasing growth of this prosperous undertaking had been refused; but markets move in a mysterious way. Nothing was done in Commercials; and next to nothing in the Suburban and Provincial group, where a few changes of quotation took place. Crystal Palace preference was restored to the list at a slight reduction; but Newcastle locally went up a point. The Continental Companies were steady and unchanged, though Imperial did not look like improving. Among the remoter undertakings, Sydney bonds rose, and Cape Town announces an improved rate of dividend. The Water Companies were very quiet; and prices were still inclined to shrink wherever there was a change.

The daily operations were: Very quiet business on Monday, and nothing moved. On Tuesday, there was not much more done. South Metropolitan fell 4, but Sydney rose 1. In Water, Grand Junction dropped 2. Wednesday's business was mostly in South Metropolitan, without change. Chelsea water receded 1. Thursday was the most active day of the week. South Metropolitan fell 1, Gaslight ordinary 1, and Crystal Palace preference 2. Prices were no better on Friday, and Gaslight ordinary moved down 1. The Stock Exchange was closed on Saturday; it being the centenary of its foundation.

PERSONAL.

For the post of Gas Manager of the Teignmouth Urban District Council, in succession to Mr. T. Stormonth, 55 applications were received and considered by the Gas Committee, with the assistance of Mr. J. G. Clark, of Newton Abbot. Two candidates were requested to appear before the Council last Thursday, and the result was the appointment of Mr. J. A. Gray, of Cleator Moor. The successful applicant is 25 years of age.

A large and interesting gathering took place at the Grimesthorpe Gas-Works of the Sheffield United Gas Company last Friday evening, when the workmen presented Mr. T. H. Hack, the late Superintendent, with a handsome case of cutlery as a token of their esteem and regard. Mr. J. Elliot presided, and spoke of the good feeling which had always existed between Mr. Hack and the men; expressing their hearty good wishes for his future prosperity. Mr. W. Heap (foreman of fitters) made the presentation, in acknowledging which Mr. Hack said it had always been his endeavour to do his best both for his employers and those working under him. A flower and fruit stand was also presented to Mrs. Hack, on behalf of the workmen, by Mr. A. L. Holton (Chemist).

OBITUARY.

The "Journal für Gasbeleuchtung" announces the sudden death, on the 17th ult., of Herr Th. Teller, Chief Engineer of the municipal gas-works at Munich, and formerly Chief Engineer to the Munich Gaslight Company. Deceased was only in his 55th year.

We regret to learn of the death, on the 27th ult., at the age of 70, of Herr Carl Herrmann, Manager of the gas-works at Gablonz-a.-N., in Bohemia. He was at one time in the service of the German Continental Gas Company, and superintended the construction and enlargement of many Continental gas-works. He is succeeded at Gablonz by his son, Herr Th. Herrmann, of Vienna, by whom the account of the new Central Gas-Works of Vienna, recently given in the "Journal," was prepared.

The death is announced of Herr Conrad Voss, the Manager of the gas-works at Cracow, Lemberg, and Bielitz-Biala. He was born in 1838, and, after a preliminary training at Messrs. Krupp's works at Essen, entered the service of the German Continental Gas Company, and in turn managed the Company's works at Gotha, Cracow, and Lemberg. When the two last had been successively transferred to their respective municipalities, he consented to give his services to these two bodies. He has left in many other places, especially in Austria-Hungary, evidences of his ability as a gas engineer.

It is with much regret that we record the death, last Sunday, from heart failure, in his 57th year, of Sir Courtenay Boyle, Permanent Secretary to the Board of Trade. He had not been very well for some time, but his death was quite unexpected. Sir Courtenay Boyle was the eldest son of Cavendish Spencer Boyle, and was Private Secretary to the Viceroy of Ireland from 1868 to 1873, and again from 1882 to 1885. In the following year he became Assistant-Secretary to the Board of Trade, and held this position till 1893, when he was appointed Permanent Secretary. In this capacity he conducted only a few days ago the inquiry into the question of the effect of electrolysis on gas-mains of which a report appears in another part of to-day's "Journal." He was the author of several publications, including "Hints on the Conduct of Business," which was issued last year, and was recently noticed in our columns. Deceased received the honour of knighthood in 1892. As a man, Sir Courtenay Boyle was extremely popular with all who knew him; and he had many interests outside his official life.

Compounds of Carbonic Oxide with Iron, and their Importance with regard to Water Gas.—A recent issue of the "Chemical News" contained the following remarks on this subject: "Roscoe and Sendder have already observed that water gas kept for some time in an iron cylinder at a pressure of 8 atmospheres contains a volatile ferric compound. Strache and Dicke, on the other hand, have shown that, under certain circumstances, the use of water gas, even when not under pressure, leaves on the Auer mantles a brown powder which quickly renders them unserviceable. But these two authorities did not agree as to the cause of the phenomenon. According to Strache, iron carbonyl is formed near the generator, at the point where the gas comes in contact with the red-hot iron. Dicke, on the other hand, asserts that this product is formed in the iron pipes by the action of the gas on the iron in the cold. Herren M. van Breukeleveen and A. Ter Horst have taken up the examination of this subject, and they confirm Dicke's opinion, and have proved it to be correct by means of a series of experiments. The gas taken at the works, or gas which has passed through lead pipes only, does not contain any iron carbonyl; but gas which has passed through iron pipes, or has even simply been in contact with polished iron for a week, contains this body. This action is in strict relation to the proportion of carbon monoxide present. A synthetic mixture of CO_2, O, CO, H, and N gave the same results. To do away with this inconvenience, it is proposed to coat the interior of the pipes with tar, or to pass the gas through sulphuric acid."

TECHNICAL RECORD.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Excursion Meeting.

The 126th Quarterly Meeting of the Institution was held last Saturday, when arrangements were made for a trip to Skipton. Probably in view of the fact that this year's President (Mr. Charles Wood), as well as the new Honorary Secretary (Mr. J. Wilkinson), are representatives of gas-works in the more easterly portion of the district covered by the Institution, the Yorkshire contingent turned out in full force, and equalled in numbers those coming from the Manchester centre.

On reaching Skipton, the party at once drove to the Black Horse Hotel, where luncheon was served, and the only formal business before the meeting was transacted. This consisted of the confirmation of the minutes of the annual meeting held in March, and the election of four new members: Mr. Alexander Allan, of Nelson; Mr. J. W. Allin, of Chorley; Mr. Matt. Dunn, of Goole; and Mr. S. G. Perrett, of Market Drayton. It was intended also to discuss the following resolution: "That a communication be forwarded to all makers of gas-meters in England, respectfully asking them (in the interests of all parties concerned) to adopt the series of interchangeable meter-unions recently submitted to, and accepted by, the North British Association of Gas Managers." On the President proposing that this should be done, several members rose to suggest that it would be advisable for the matter to be deferred until the next regular business meeting. One member also said he thought that meanwhile it might be well for the Committee to inform themselves as to the present condition of the negotiations that have so long been pending between the North British Association and the various meter-makers. The question was thereupon adjourned.

The remainder of the day was taken up by a coach ride to Bolton Abbey, *viâ* Barden; the return journey being timed so as to enable members to reach Skipton for tea and early trains back to Manchester and Bradford. The weather throughout the day was altogether propitious, and a very satisfactory excursion was arranged, thanks to the programme which had been prepared by the President and Hon. Secretary, assisted by Mr. S. S. Mellor, who retired from the latter office at the March meeting.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

A Meeting of this Association was held last Saturday, at the Manchester Technical School—Mr. Clarence Berry, of Hyde, presiding.

Mr. Ernest Fearon, of Salford, read the following paper:—

SOME NOTES ON INCANDESCENT GAS LIGHTING.

The subject of lighting streets, houses, shops, &c., by means of incandescent gas-burners is one that has come very much to the fore of late years, and is likely to be still more prominent in the future. It is not my intention to weary you with a long account of the invention of this method of illumination; but it may be interesting to take a glance back to the beginning of the last century, when we first hear of light being produced by raising refractory substances to high temperature. It is first mentioned in 1823; and the first patent was granted to Cruickshank in 1839. In this invention, a gauze or wirework of platinum, or its alloys, was exposed to the flame of water gas, carburetted with liquid hydrocarbon, and diluted with air. In 1851, a Mr. White introduced an improvement on the process at the Philadelphia Gas-Works; and about the same time Mr. Gillard proposed to make hydrogen from water, and use it as an illuminant with the aid of the incandescent burner. This process created a great sensation at the time, but proved uneconomical, and therefore soon dropped out of sight. It was not revived till 1885, when Professor Lowe introduced it in connection with his cheap methods of making water gas.

The year 1885 is notable as being the one in which Auer von Welsbach produced the first practicable incandescent light from the oxides of the rare earths—cerium, zirconium, lanthanum, yttrium, &c. Prior to this, various attempts had been made to produce an incandescent light; and in the early eighties, we read of the Lewis and Clamond mantles, in which platinum and magnesia were respectively employed. The light, however, though good at first, soon fell off; and the inventions were unsuccessful. The composition of Welsbach's first mantles was 50 per cent. of oxide of zirconium, and 50 per cent. of oxide of lanthanum. But they were a total failure, so far as giving light went, as the light emitted was only about 5 candles per cubic foot of gas used. During the next few years, various different solutions were tried; but all were more or less failures, till in 1891 it was found that the presence of small quantities of ceria made a marvellous difference in the light emissivity of the mantles. The present-day mantles contain 99 per cent. by weight of thoria, and 1 per cent. by weight of ceria, and have an efficiency of about 20 candles per foot of gas consumed. The colour of the light has been greatly improved of late years. The first mantles gave a very disagreeable greenish sort of light; but now the light is, to all intents and purposes, almost white.

Like the mantle, the burner employed in connection therewith has provided a big field for inventors. For indoor lighting, the ordinary "C" Welsbach and the Kern burner would appear to be the most used; larger and more strongly-made burners of the latter type being employed, either singly or in clusters, for street lighting, though the comparatively new system of lighting by means of high-pressure gas is bringing forward many innovations in the way of burners. As a rival of the electric arc lamp for lighting squares, boulevards, and open spaces generally, this system, like certain well-known pens, has "come as a boon and a blessing"—to gas engineers! Most of you, no doubt, have seen the installation in front of the Infirmary, in Piccadilly, which is, in my humble opinion, quite equal to anything in the way of arc lighting that I have ever seen. The cost of the plant, &c., may deter many managers from experimenting with it yet awhile; but it has, I think, "come to stay." The latest addition to the ranks of high-pressure lighting—the Scott-Snell self-intensifying lamp—does away with these disadvantages, being self-contained, and needing neither pumping plant nor separate main; and from some tests made with it, published a short time ago, it would appear to do all that is claimed by the makers. A short description of some of these forms of high-power incandescent lighting, with a few facts as to efficiency, cost, &c., may not be out of place here.

Somzée-Greyson System.

In the Somzée-Greyson system of intensified gas lighting, the gas is compressed by means of a small hydraulic ram, which is fixed on top of a compressor, into which the gas is led. From the compressor, the gas is delivered into an automatic regulator, whence it issues at the required pressure—usually nine to ten inches. The plant is made complete by the addition of a by-pass and back-pressure valve, which come into action in the event of a breakdown or stoppage of the compressing plant. The supply is then kept up at the ordinary town pressure, with, of course, a corresponding diminution of lighting effect. The usual method is to have three burners, contained in a large lantern of the refuge type. Each burner consumes 10 cubic feet per hour at 9 inches pressure, and gives an efficiency of about 30 candles per foot; the mantles being made larger and stronger than the ordinary to withstand the increased pressure. Each lamp is thus equal to the nominal 2000-candle power electric arc-lamp; and practically no difference in lighting effect can be detected between them when in use. The cost by this method works out at 1·2d. per 1000-candle power, with gas at 3s. per 1000 cubic feet; and adding on 0·1d. for water, the total cost is 1·3d. per 1000-candle power, which shows a considerable reduction over lighting by incandescent burners at the ordinary pressure.

The Scott-Snell Lamp.

This lamp is an altogether new departure in incandescent high-pressure lighting, and possesses many advantages which will doubtless secure for it a successful career. The invention consists in the addition to the ordinary street lamp of a hollow vessel arranged immediately above the central aperture in the reflector. The under surface of this vessel is heated by the burner, and the upper surface is cooled by means of a water-jacket. Inside this hollow vessel is a "displacer," of similar shape to the vessel itself, but clear of the sides, and about $\frac{5}{8}$ inch less in vertical depth. A stem passes up from the displacer to a flexible diaphragm fixed in a cap on the top of the lamp, and a spring is employed to take the weight off the displacer, so that the diaphragm is flat when the lamp is out of action. The action which takes place when the burner is lighted is the following: The gas passes to the box through a non-return valve, where it is heated and expands, raising the displacer and forcing a portion of it through a weighted non-return valve into an annular reservoir in the head of the lamp, from which reservoir the burner is fed. A very small fall in the pressure causes the displacer to descend; and this movement forces gas from the hot side to the cold side of the box, where it contracts to such an extent as to cause a partial vacuum—thus enabling the supply pressure to open the inlet valve to admit more gas, and the cycle is repeated. At the base of the burner is mounted a special two-phase nipple, which provides duplicate feeding apertures—one for the high and one for the low pressure. By a special arrangement, when first lighting the lamp the low-pressure feed alone is in action; but on the intensifying action setting up, this aperture automatically closes, and the high-power feed comes into action. It is thus possible to use the lamp as an ordinary lamp, or by merely opening a cock, admit the gas to the vessel containing the displacer, and allow the lamp to intensify.

From some tests made with the lamp last December, by Mr. Dugald Clerk, I take the following figures: The gas pressure from the main was $2\frac{3}{4}$ inches, and the illuminating power 65 candles. Two minutes after lighting, the pressure had been increased to about 18 inches, and the illuminating power to 300 candles; the light being given at the rate of 27 candles per foot.

The advantages may thus be summed up: Each lamp is self-contained; should one lamp by any means be put out of action, the others are not affected; the first is the only cost. Also, it can be used as a high-power lamp during the hours when traffic, &c.,

is greatest; then used as an ordinary 60-candle power lamp the rest of the time that the lamps are lighted.

Keith's System.

Another system which finds much favour is the Keith patent compressing plant, made by the Water-Motor and Automatic Liquid Elevator Company. It can be worked by the ordinary water service, either from the street-main or from a cistern. The apparatus consists of two cylindrical vessels mounted on one bed-plate; one being the compressor, and the other a weighted governor. Inside the compressor, to which the gas-supply is connected, is a double-acting pump, which alternately draws in gas from the main and expels it into the governor, whence it goes, at the desired pressure, to supply the lamps. The governor is connected, by means of a jointed arm, to the water-inlet to the compressor, and automatically regulates the amount of water according to the number of burners in use. Where water-power is not available or not convenient, the compressor can be driven by a small hot-air engine, or from a shaft by the addition of a pulley and strap.

The burner used in connection with the plant has some special features which are worth noticing. By an arrangement of cones at the bottom, it can be adjusted to suit any particular quality of gas, so as to ensure complete combustion. In order to clean or renew the gauze, it is merely necessary to lift off the holder carrying the mantle; thus preventing any damage to the latter. It is also claimed that it will not light-back under any variation of pressure. The consumption of water is stated to be very low; being 1½ gallons an hour for every 10 cubic feet of gas compressed. With gas at 3s. per 1000 cubic feet, the cost would be 1·2d. per 1000-candle power, or (say) 1¼d., including everything.

The Kitson Lamp.

Though this light is produced by means of oil, and is therefore not of direct interest, a few facts concerning it may be worth mentioning. The oil is supplied to the lamps from cylindrical tanks, varying in dimensions from 2 feet in length and 10 inches in diameter, up to 4 feet in length and 14 inches in diameter, with a capacity ranging from 5 up to 40 gallons of oil. The oil used is a special brand of the finest refined Anglo-American, known as "Kitson Incandescent Oil," with a flash-point of 110° Abel test. After a supply of oil is passed into the tank, air is pumped in up to a pressure of 50 lbs.; and this first charge of air lasts for all time—all that is necessary afterwards being to replenish the supply of oil as it becomes exhausted. The oil is led from the top of the tank to the lamp or lamps by ⅛ inch (outside diameter) copper tubing; and the quantity passing is automatically regulated according to the number of lamps in use. A 1000-candle power lamp requires approximately half-a-pint per hour; and it has been calculated, from installations in actual use, that the cost, including everything, does not exceed 0·8d. per 1000-candle power per hour.

The lamps are of a special design; the oil being led into a vaporizing-tube, and there gasified by the heat from the mantle. Thence the oil-vapour passes into an open mixing-tube on the top of the reflector, where sufficient air is drawn in to support combustion. The mixture then travels down to the mantle, inside which it burns. A torch, similar to a blow-pipe, is used to light the lamps. This heats the vaporizer; and, the oil being turned on, the light is immediately obtained. Ordinary Welsbach mantles are employed; and the life is reckoned at 200 hours with this system. The light obtained, as tested at Washington, averaged 600 candles per mantle. Lamps are also made on this principle for indoor lighting—to stand on the table, &c., in a similar manner to the ordinary oil-lamp.

Comparative Costs.

Let us now turn our attention to this question. It is a somewhat difficult matter to compare the cost of various systems of lighting, as so much depends upon the point of view that one takes as to illuminating power and illuminating effect, which are two vastly different things, though so often treated as being identical. Like that much-maligned instrument, the household gas-meter, illuminating power is one of those subjects not understood by the "man in the street." It is a constant worry to the gas manager, especially in the cold, foggy weather of November and December, when complaints pour in at an overwhelming rate, though the gas may be ever so good when tested at the works. Still, as a basis of comparison, the illuminating power as tested on a standard photometer, will hold good for all practical purposes, though this cannot be taken in the case of electric arc-lamps, the illuminating power of which is largely a matter of conjecture.

Taking the largest arc lamp in general use, the 2000-candle power nominal, this will give, as a rule, about 900-candle power, and take 10 amperes of current, at a pressure of 50 volts—*i.e.*, 500 watts, or half a unit. Assuming electricity to be supplied at 3d. a unit, which is well on the safe side, as not many towns supply it at such a low figure, 1000 candles would cost 1·666d. Turning next to the electric incandescent lamp, which is mostly used for indoor lighting, the 16-candle power lamp may be taken as an example. This lamp, at the usual pressure of 100 volts, requires 0·56 ampere of current—*i.e.*, 56 watts—per hour, and will give about 12 candles on an average, as the candle power falls off very much after the first 200 hours or so. At 3d. per unit, 1000 candles would cost 14d. with this method of illumination.

Coming now to gas, probably the burner that is in most general use is the union jet; and with a consumption of 5 cubic feet per hour, this will give an efficiency of about 2½ candles per foot. With gas at 3s. per 1000 cubic feet, it will cost 14·4d. to produce 1000-candle power—*i.e.*, practically the same as the incandescent electric lamp.

Oil compares exceedingly well with gas as an illuminant, as the following figures will show: I tested a lamp, bought in an ironmonger's shop—the cost of the whole thing, lamp, chimney, and globe, being some 2s. or 3s.; and when the lamp was burning under the best conditions (just short of smoking), I obtained an efficiency of 12·4 candles, with a consumption of 0·088 pint of oil per hour. With oil at 1s. per gallon, it would cost 10·51d. to produce 1000-candle power. Last, but by no means least, let us see how incandescent gas works out on the same footing. From a number of tests made with a No. 3 Kern burner, using a fresh mantle for each test, I obtained an efficiency of 55·66 candles, with a consumption of 3 cubic feet per hour, equal to 18·55 candles per foot. Allowing a deterioration of illuminating power of 33⅓ per cent., that will give us an average of 12·37 candles per foot; and to produce 1000 candles by this means would cost 2·91d., gas being at 3s. per 1000 cubic feet.

The following table will show at a glance the comparative costs of the different sources of light, as enumerated above:—

Cost of Producing 1000-Candle Power for One Hour.

Source of Light.	Cost in pence.
Electric arc	1·66
Incandescent gas	2·91
Oil	10·51
Electric incandescent	14·00
Flat-flame gas	14·40

Low-Grade Gas.

There is, however, a vast field opened up for gas lighting by the fact that gas of 7 or 8 candle power will give almost equally as good results when consumed in an incandescent burner, as gas of 18 or 20 candle power; and no doubt the day is not far distant when this method of lighting will be universal. Even the dingy retort-house may become a "thing of beauty and a joy for ever;" while the photometer will be relegated to the scrap-heap, and the calorimeter reign in its stead. This may seem something of an exaggeration; but on the Continent, where they are far ahead of us in the use of incandescent burners, lighting by means of low-grade gas is an accomplished fact. In this connection, I take the liberty of quoting some figures and remarks from a paper read before the Gas Institute last June by Mr. Webber, entitled "The New Gas." He says:

> Broadly speaking, in the most advanced of German cities, and wherever the gas company do their duty and work in a business-like style, there is now nothing else but incandescent gas lighting. Berlin has gone past electric lighting, and will have nothing but incandescent gas in the streets. All over the wide region covered by the German Continental Gas Company the last year's increase of burners on the Company's books was divided as follows:—
>
> | | | |
> |---|---|---|
> | Incandescent burners | 21,842 | = 91·64 per cent. |
> | Flat-flame burners | 1,895 | = 7·95 ,, |
> | Argand burners | 98 | = 0·41 ,, |
>
> And the replacement of old luminous flame burners by incandescents is going on everywhere with similar rapidity. The regenerative lamps have gone utterly. Indeed one has to hunt for a luminous-flame gas-burner in Dessau or Magdeburg. The Gas Company aver that they cannot afford to use them. Incandescents are in all the retort-houses and workshops—the "Gem" pattern, with air-holes in the side of the chimney, being preferred for this use. Moreover, with 50 per cent. of the daily output sold for cooking, heating, and motor-power generation—as in many cases here—the element of illuminating power dwindles into insignificance on all sides.

He goes on to give the results of some experiments which were carried out at Dessau, with gas enriched by benzol, of an illuminating power of 14·7 Hefner units (12·77 English candles). The gas was deprived of its benzol by passing it through wool steeped in creosote oil; and the efficiency of the burner actually rose as the illuminating power of the gas fell. At the start, with the gas showing 12·77 candles, the incandescent gave 64 candles; and on the illuminating power being reduced to 2 candles, the incandescent showed 73·6 candles, with a consumption of 3·67 cubic feet. We cannot, it is true, expect to ever be able to supply 2-candle gas; but taking the official tests of gas at Magdeburg during the first fortnight of March last year, the average illuminating power was only 11·15 Hefners = 9·7 English candles, which is considerably lower than the gas supplied in any town in the United Kingdom of similar size. Gas of this nature could easily be sold at 1s. per 1000 cubic feet, when the cost of producing 1000-candle power would be reduced to 0·97d., which compares with electric arc lighting at 1¾d. per unit.

I have made some tests with low-grade gas myself, within the last few months, the details of which I am not at liberty to give you; but they entirely corroborate the above. In a general way, I may say that, with gas of about 6½ candles, I have obtained an efficiency of 13½ candles per cubic foot, when consumed in a Welsbach "C" burner. With 9-candle gas, the efficiency rose to 15½ candles per foot; and with 15-candle gas, to 16 candles. No doubt the duty might be improved if a burner specially adapted for low-grade gas were used, as the air supply in the ordinary incandescent burner is made for use with from 16 to 17 candle gas, which requires more oxygen for its complete

combustion than gas less rich in light-giving constituents. In fact, experiments I carried out with hydrogen clearly show this. When consumed in a "C" burner, with the air-holes fully open, the light obtained was very poor; being only some 20 candles, with a consumption of 7 cubic feet per hour. Upon entirely closing the holes, the light increased to 70 candles, with a consumption of 6·3 cubic feet, or 11·11 candles per foot.

Altogether, one is led to the conclusion that much remains to be investigated with regard to the effect of different qualities of gas when consumed in Welsbach burners; and it would seem that it is the *concentration* of heat upon the mantle more than the *total quantity* of heat produced which is the main factor in determining the efficiency of any particular gas. It is also an interesting point whether air should be admitted to the mantle from underneath or from the side—*i.e.*, through apertures in the chimney. Personally, I have found that the latter method, used in conjunction with a cone to stop the air from entering underneath, gives an increase of nearly 40 per cent. in efficiency with a "C" burner, though what effect, if any, it has on the life of the mantle, I cannot say at present, as it is only within the last month or two that I have had any experience with it.

Town Lighting.

I will not trespass much longer on your time; but before concluding, I should like to say a word or two as to the application of incandescents to town-lighting. It will generally be found that there is some saving in the quantity of gas used, as compared with lighting by means of flat-flame burners; but the actual saving in money, taking everything into consideration, is very small. Assuming that the lamps are lighted for 4000 hours during the whole year, a flat-flame burner, consuming 5 cubic feet per hour, would cost, with gas at 3s. per 1000 cubic feet, exactly £3; a No. 4 Kern burner, consuming 4 cubic feet per hour, would cost £2 14s. 6d. for the same period, allowing for a bye-pass at ¼ foot per hour, and for renewal of mantles at the rate of six per annum. There is also the first cost of some slight alteration to the lanterns, anti-vibrators, inspection of burners and mantles, &c. So that altogether the cost would be about the same. But, on the other hand, the light would be increased (say) four-fold.

Lately, several attempts have been made to dispense with the bye-pass in street-lanterns, notable examples being the Foulger-Glover torch, in which the head of the torch, when in position, is tilted, so as to come over the top of the mantle, and so light it; and the Simmance-Abady patent system, consisting of a special cock and torch. The cock being given a half-turn admits gas to a bye-pass, which is lighted by means of the torch; another half-turn admits gas to the burner, which is lighted from the bye-pass, and simultaneously shuts off the bye-pass. This means a saving of 3s. or 4s. per burner per annum in the cost of gas to the bye-pass.

With high-power lamps of 1000-candle power at crossings and in the main thoroughfares, costing a trifle over 1¼d. per hour, it will be granted that lighting by gas is by no means in the moribund state that certain interested parties would have people believe, though, if the Kitson oil-lamp does all that is promised, we, on our part, shall have to look to our laurels, or they may go to adorn the brow of our rival.

The Secretary read a communication from Mr. Frank West in which the writer stated that incandescent gas lighting had been before the public for some time, and was steadily attaining greater efficiency. It was found that light emitted from incandescent mantles of similar size varied; and in some cases very considerable difference occurred. In some experiments he had made with the Welsbach 1893 pattern burner and the "C" mantle, tested on a modern photometer, he had found that two good mantles each gave an illuminating power of 20 to 22 candles per cubic foot of gas, the quality of gas with the "London" argand being 19¼ candles, and the consumption of gas through the incandescent burner being at the rate of 3¾ cubic feet per hour at a pressure of 12-10ths. A test of a mantle which had been in use for some time, taken with the same quality of gas, gave a light of 15⅜ candles, which showed that the luminosity diminished during the life of the mantle. He also found that the average life of a mantle varied from 600 to 1000 hours. He had had one in use for more than a year; and the luminosity was not materially diminished. But this was an exception. Different qualities of gas had a material effect upon the efficiency of the incandescent burner; and the latter should be adjusted in every town to suit the quality of the gas. It was found that, with a mixture of water gas and coal gas, less air was required to produce combustion than by using coal gas alone, owing to the different specific gravity of the gases. It would be interesting to have information as to the cost of lighting by the intensified incandescent system, and as to how it compared with the Kitson oil light, which was being rapidly introduced into workshops, &c., the cost being about 4-5ths of a penny per hour per 1000 candles. Surely, with intensified incandescent gas, they could compete with this rival, just as it was already pushing out the electric arc lamp—an example of which might be seen in front of the Infirmary, where experiments were being carried out by the Corporation.

Mr. Fearon said the variation of efficiency in mantles was to a certain extent due to some parts shrinking more than others. He had never got 22 candles per cubic foot out of an ordinary mantle; his highest duty being about 18 candles.

Mr. Hill asked whether the low-grade gas which was referred to in the paper was ordinary gas diluted, or low-grade gas specially prepared.

Mr. Fearon replied that it was produced from slack, using very high heats, and not diluted at all, for the 7-candle power, and for the 9-candle and other qualities a small percentage of ordinary coal was used to bring it up to the required standard. They found what was wanted by experiment. He did not think they could get correct results by using ordinary gas and diluting it.

Mr. Stoddart referred to the possibilities of the Mond process, and remarked that it had been shown that a gas of low power could be used satisfactorily with incandescent mantles for lighting purposes, while for motive purposes they did not require gas with great light-giving property. If incandescent mantles became universal, this was the gas which would be required. He thought it might be worth the while of some bold engineer to go into this matter very seriously, and, if he were allowed, to put a low-candle gas on the market, and supply mantles free to the consumers. The difference in the cost of production would, he believed, well pay for the mantles used in the evening; and in the daytime there would be an increased consumption for motors. He was convinced that the coming method of gas lighting was by incandescent mantles.

Mr. Fearon said he had no information as to the probable cost of such a scheme.

Mr. Stoddart thought gas could be produced at a gas-works of much higher calorific value than the Mond gas, and practically as cheap.

Mr. Fearon said they claimed that it could be produced at 3d. per 1000 cubic feet. He did not think they could produce it at gas-works at anything like that price; and, again, corporations and gas companies were bound by Act of Parliament to supply gas of a certain illuminating power, and would have to go to Parliament for authority to send out anything less.

Mr. Stoddart said, of course, he was presupposing that the engineer was allowed to reduce the illuminating power.

The Chairman remarked that, as he understood the question, so far as using the mains at present in existence for the Mond gas was concerned, it could be done very well for incandescent lighting. But he gathered that they would need great pressure in the daytime for motive power, and the present mains would not stand it.

Mr. Stoddart pointed out that the calorific value could be increased so that the pressure could be reduced. In considering the value of a gas of this kind, they must remember that tar was a drug on the market, and this would enable them to use a large quantity of it at their works.

Mr. Critchley (St. Helens) said that a couple of months ago he had to get out a statement as to the number of consumers using gas through incandescent burners. Taking those having coin meters, 5 per cent. used incandescent burners; but he thought the proportion would be larger if they took the consumers using ordinary meters. About 13 per cent. of the public lamps were fitted with incandescent burners.

Mr. Fearon observed that with a better mantle incandescent gas lighting would "go ahead like wildfire."

The Chairman remarked that at his own house he found the effect of the incandescent light on the ceiling above it was much greater than that of the ordinary flat-flame burner. This led him to think that more heat was generated.

Mr. Hill observed that this was probably only a local effect.

Mr. Fearon said it had been found that the general heat of the room was not raised so much.

Mr. Halliwell said gas consumers needed a good deal of education with regard to the incandescent gas-light.

Mr. Dudley concurred in this opinion, and pointed out the importance of cleaning the burner occasionally. With proper attention, incandescent gas lighting would, he said, far eclipse the electric light.

Mr. Fearon agreed with Mr. Dudley as to the importance of cleaning the burners.

Mr. Barber did not think public street lighting would be satisfactory until it was in the hands of the gas engineer and gas department, which in many cases it was not. They could then see to the cleaning and renewal of mantles when necessary.

Mr. Halliwell proposed a vote of thanks to Mr. Fearon for his interesting paper.

Mr. Stoddart seconded the motion, and it was unanimously adopted.

Mr. Fearon briefly responded, and the proceedings closed.

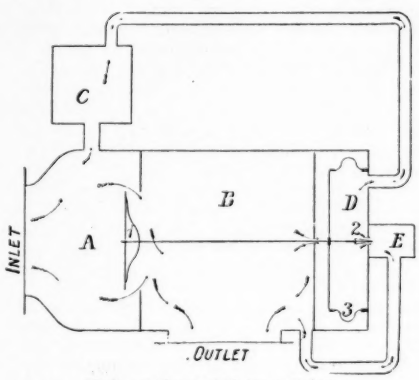
OHIO GASLIGHT ASSOCIATION.

(*Concluded from p.* 1228.)

The Editor of the Novelty Advertising Department, Mr. B. W. Perkins, of West Bend (Ind.), presented his report, which included a very large number of suggestions and examples from practice, supplied by various members. Letters of blue cement let into the concrete walk in front of the office, electric sign lamps, showing such words as "cook with gas," head lines in newspapers, thick glass let into side walks, with lettering on the underside, illuminated at night by electric lights, repeating phonographs either inside or outside the offices, to announce advertisements, or to lecture on the merits of gas-stoves, cottage cookery demonstrations, free installation and maintenance of incandescent gas lights, giving away paper weights, rulers, and such things as are likely to be kept in regular use, advertising on the backs of the

gas bills, annual statements of consumption, &c., with advertisements attached, prizes of a free stove for the best treatise on cooking by gas, calling coke a "sootless fuel," advertising accidents with oil-lamps and electricity, a box with glass sides filled with loosely packed coke with a red electric lamp in the centre, a large kite carrying a 30-feet banner, exhibitions of gas appliances in shop windows, and giving away tin cups, buttons, &c., bearing advertisements, with many other items, were mentioned.

Mr. G. W. Barnes, of Pittsburg (Pa.), gave a description of his proportional station meter. The device was described as early as 1863 in connection with water-meters, but met with no marked success until a demand for a meter of this kind was created by the natural gas companies. The difficulty in all earlier experiments had been the maintenance of a constant ratio of loss of pressure through the proportionate openings; and this had now been quite overcome. The apparatus consists of a main body



1. Main or Shunted Volume Valve.
2. Coefficient Volume Valve.
3. Controlling Diaphragm.

divided into three compartments A, B, and D. The main inlet is on A, from which a small pipe passes to the inlet of the meter C; and the outlet is connected up to a diaphragm governor contained in D, and the outlet of the governor communicates through E with B. The spindle of the rod carrying the cone valve is prolonged, and carries a large disc valve, which controls an opening between A and B. The area of the opening for the cone valve on the governor is in the same ratio to the area of the opening of the disc valve, as the determined capacity of the meter is to the volume passing through the disc valve; so that, in all positions of the valves, a constant proportion of the flow is diverted, caused to pass through the small meter C, and measured. The main outlet is on B; and the bulk passes through the disc valve from the inlet on A to the outlet on B. The proportion to be measured passes from A, through the meter to the governor, and thence to B. In starting, the gas entering A, closes the disc valve, and no gas flows until a sufficient quantity has passed the meter and entered the governor to lift the disc and open the two valves. This done, gas passes, and the equilibrium is preserved by the pressure of the outlet gas acting on the exterior of the diaphragm governor. The action of the apparatus is adjusted automatically by the effect of the inlet pressure on the disc valve and the effect of the outlet pressure on a somewhat larger disc formed by the top of the governor.

Discussion on the paper was commenced by Mr. Chollar, who stated that he had used the proportional meter for some time, and thought that, with about the same care as would be bestowed on an ordinary station meter, it might be relied on as an accurate instrument within reasonable working limits. Mr. J. T. Lynn said that some two or three years ago he tested a proportional meter, and found it fairly accurate at about the nominal capacity, but not reliable at a considerable variation. A 10,000 cubic feet meter would be fairly satisfactory at about that quantity; but if the flow was reduced to 1000 or 1500 cubic feet, the results would not be good. He had used a proportional meter for water gas, fixed between the relief and storage holder, and found it acted as perfectly as any other meter. But he knew of a case where it proved a complete failure under similar circumstances. He would like some information as to the range of flow and pressure that the instrument would satisfactorily deal with. He had also some experience with varying consumptions of natural gas, and found that at times of full load the indication was about correct; but it was slow at minimum load. Mr. Schwarm understood that three-fourths of the natural gas sold in Pittsburgh passed through proportional meters.

Mr. Barnes, in replying, said that the limits of flow or pressure within which the instruments would act properly could be controlled by the maker, who could adjust them to the work required. They could be so constructed as to deal with such small loads as 1000 cubic feet per hour, but would scarcely be arranged for such a small quantity unless specially ordered. The total drop or loss of pressure on the instrument was, under all circumstances, double that due to the meter. If the flow through was 100,000 cubic feet per hour. and the measuring coefficient $\frac{1}{200}$, then 500 feet per hour would pass the meter and absorb perhaps 5-10ths. The flow could be increased to 150,000 cubic feet or so without causing increase of pressure; and at 50,000 cubic feet per hour, or less, the pressure required to work the meter would not be so much. The proportional meter was rated at the works by means of an apparatus called a flow meter, which had two drums —one inside and half the diameter of the other. The inner drum was perforated all over, and the outer one had calibrated holes known to give a certain flow under a certain pressure. For instance, a $1\frac{1}{2}$-inch hole in a $\frac{1}{16}$-inch plate would pass exactly one cubic foot per second under 40-10ths pressure at standard conditions of the thermometer and barometer. In practice, the variation caused by differences of atmospheric pressure and temperature was balanced by varying the pressure. Knowing that the flow was 100 cubic feet in 100 seconds, they could adjust the proportional meter accordingly. Several such holes were provided in the outer drum, all fitted with tight plugs; and one or any number of them could be used as required. He believed that the whole of the gas sold in Pittsburgh for the last ten years had been measured through proportional meters.

At this stage, the report of the Committee on a National Advertising Bureau was presented. It stated that the Western and American Associations had deputed representatives to join the Committee, and that the scheme was approved by prominent gas-men. As an indirect result of the movement, some large companies had extended their local advertising, and others had taken up the matter for the first time. The report cited examples of successful advertising of goods, some of which could not represent more than a consumption per household of 4s. or so per annum—a mere fraction of the revenue obtained from a gas-stove; and if it paid to advertise these things, it would also pay to spend (say) £10,000 per annum in advertising gas. This sum looked large, but would not be much for each one if divided over all the gas companies in the country. Mr. Persons considered the matter well worthy the attention of the Association, and suggested the formation of a Bureau for united action among the members. He exhibited a catalogue as an example of what could be done in other trades in the way of united action in advertising. Mr. Stephens said the suggestion was a good one; and he thought that the Association might take the matter in hand and work it in such a way as to substantially aid the funds. He knew this could be done from personal experience in another Association. Mr. M'Ilhenny said that the original licensee companies under the Edison patents were a very compact and close Association; and one of their plans was that any member bringing out a new advertisement or bill, should mail a copy to every other member. Gummed address labels were provided for this purpose, and thus every member got the benefit of the new ideas. Mr. Butterworth moved that the matter be referred to the Executive Committee, with instructions to co-operate with the other Associations in devising some scheme whereby all could get good advertising matter at low prices; and this was agreed to.

Mr. F. W. Stone, of Ashtabula (Ohio), read a paper on "Business Outside the Usual Channels," describing some special technical uses of gas—such as for pea-nut roasting and ripening bananas, roasting coffee, heating tinmen's soldering irons, special brazing furnaces, and forges. For the latter purpose he had found 2000 cubic feet of gas were equivalent to 12 to 16 gallons of fuel oil, or to 300 to 500 lbs. of coke. One advantage was that a greater amount of work could be done in a day with gas than with solid fuel. A furnace arranged for brazing ferrules showed a result, for the day's work, of 2500 ferrules brazed at a cost of £1 0s. 10d. The same furnaces when heated with gas showed 3300 ferrules, brazed in the same time, at a cost of £1 2s. 11d. The number of defects was much less with gas than with coke. The same furnace required 16 gallons of oil for a day's work. A forge equipped for heating small steel blanks yielded, with coke, 2000 blanks, at a cost of £1 1s. 8d.; heated with gas, 2700, at a cost of £1 2s. It was impossible to burn the steel, with gas. For the same work, 14 gallons of fuel oil were required. Some single and double gas-furnaces for heating the ends of the irons for drop forging or welding, for heating butts of forks, and for heating perforated sheets, were described. At current prices, there was no economy in the first cost of gas as compared with oil; but the oil required storage-tanks, high-pressure blowers, and other expensive machinery that was not necessary with gas. A small fan, capable of maintaining a pressure of 4 oz., was quite sufficient for the gas. The burner should be so constructed as to give the best possible mixture of air and gas; and the size of the furnace or forge should not be larger than was absolutely necessary. It was better to heat a small number of articles rapidly than a large number slowly. It had been objected that iron or steel heated by coal gas would not make a good weld, on account of a deposit of black oxide; but he had never found any difficulty in welding bars up to $\frac{1}{2}$-inch diameter. A workman could in all cases do 30 to 50 per cent. more work with gas than with other fuel, being able to get entire control of the heat.

Mr. Perkins commenced the discussion by strongly approving the remarks made by the author. Mr. Andrews followed in the same vein, saying that there were many other ways of advancing the use of gas besides giving away stoves. In his district, one factory alone used 20,000 cubic feet of gas a day for soldering tin cans. In every city there were numerous special technical purposes to which gas might be applied. Mr. Clapp mentioned a cycle factory that used 40,000 cubic feet of gas per day for soldering, enamelling, and brazing. Mr. Somerville instanced the use of gas for assisting the ventilation of churches or schools, by placing a gas-jet in the foul-air outlet to increase the draught. General Harbison would like to hear from any member who had applied

gas in his own tool shops at the gas-works. There were hundreds of blacksmiths' forges in steady operation ten hours a day in every district; and if they could all be induced to use gas, it would be a great help to the consumption.

Mr. Stone, in replying, doubted if it would be practical to make a gas-forge that would take all and any kind of smith's work. The forges described in the paper were designed by himself, in conjunction with the foreman of the forge shop. The reason why more work was done with gas than with the solid fuel, was because the man did not have to keep stopping to make up, and attend to, his fire.

The Editor of the "Wrinkle Department" submitted a report, which was read by Mr. Butterworth. A method for utilizing one of a set of ordinary retorts for enriching by means of oil was described. A sight feed is placed in a convenient position outside the retort; and a wrought-iron pipe passing through a hole in the mouthpiece delivers the oil into a length of 2-inch pipe laid flat on the bottom of the retort, and extending to within a foot or so of the back. Another wrinkle was a method of controlling window lights from outside, enabling a night watchman, by means of a special key, to turn up the lights inside, so as to make an inspection of the premises. One very good idea was a pressure gauge with the outlet limb bent nearly to the horizontal, instead of being perpendicular, with a scale laid off on the horizontal travel. Thus the range is magnified, and very accurate readings are obtainable. As a means of indicating the height of a holder in the office or meter room, a tank of water in the crown of the holder was connected up to a Bristol pressure gauge; a length of flexible metal tubing being used at the holder.

Speaking in reply to questions from the question-box, General Hickenlooper suggested that a good way of repairing a leak in the bottom of a cast-iron or steel holder tank was to empty it, and place a layer of concrete four or five inches thick all over the bottom. He spoke highly of the qualities of water-gas tar as a paint for holders and tanks and ironwork generally; also for all kinds of masonry foundations, as a means of keeping out water. All his buildings were treated in this manner to a height of about 3 feet above ground level. He also mentioned that at Hamilton several miles of roads had been laid with macadam mixed with tar. The results were very satisfactory; and the subject was worth the attention of all who found difficulty in disposing of their tar. Mr. Andrews said that 1000 cubic feet of gas used in a gas-engine would yield about 30 units of electricity. There was an animated discussion as to what proportion of the cost of a gas cooking-stove could be borne by the company. Several members advised liberality in this direction; some being prepared to go to the extent of bearing the whole cost, if necessary, to get the stoves used. As to the average consumption of gas per stove per annum, some put it as high as 30,000 cubic feet, others as low as 14,000 feet. Mr. Stone said that, supposing the net profit on gas to be 1s. 3d. per 1000 cubic feet, and a stove to be given away, 62,000 feet would have to be sold before the actual cost was recovered. Mr. Schwarm said that the Gas Company at Lorrain gave away 250 stoves about five years ago; and if the town was canvassed to-day, not 50 of them would be found in decent working condition. He preferred to sell at cost, by instalments if necessary. General Harbison advocated getting the uses of gas well advertised, bringing influence to bear on builders and architects to get proper accommodation provided for stoves, rather than giving away appliances, or selling at less than cost. For securing slates on a retort-house roof, Mr. Schwarm used copper nails put in from the outside and clenched. Mr. Somerville had found lead wire about ¼-inch diameter the best thing he ever had for the purpose. Mr. Andrews preferred terra-cotta tiles to slates. Mr. Lynn put on a slate roof with clenched lead nails; but it did not stand the wind, and he therefore substituted copper nails. General Harbison said that some fifteen years ago he covered a retort-house roof with best Vermont slate, double lap, fastened with flat-headed lead nails 3 inches long and $\frac{3}{16}$ths diameter, clenched round the angle irons with ordinary pincers. It proved eminently satisfactory; while other plans he had tried had given much trouble. But for the last six years or so he used nothing but corrugated iron, with a layer of asbestos underneath, supported on wire netting.

After arranging a few business matters, the meeting closed with the usual votes of thanks.

The Gas and Water Trades Exhibition at Vienna.—We learn from "Der Gastechniker" that this exhibition, which, as already announced, will be open from the 25th of May to the 25th of June, is attracting great interest on all sides. The Archduke Leopold Salvator, of the Imperial family, who is a technical man, is specially endeavouring to render it a great success. The exhibits will be on an unusually comprehensive scale, and those from Germany will be particularly conspicuous, as all the leading German firms will be represented. Special efforts are being made with the illumination of the park by night, in order to show the various methods of lighting by gas, and to demonstrate their applicability to public places. Large pavilions to contain the exhibits are being erected in the magnificent park of the Imperial Horticultural Society, which is being given up for the time being to the exhibition. The Paris Gas Company have sent a unique model kitchen, valued at £400. The Minister of Finance has specially exempted exhibits from import duties, and the Austro-Hungarian railways will convey back free of charge all which remain unsold at the close of the exhibition.

THE PUBLIC LIGHTING OF PARIS.

In previous issues of the "JOURNAL" (*ante*, pp. 941, 994) we have noticed three of the supplementary communications included in the "Compte Rendu" of the Paris Gas Congress last year. Another embodies some interesting statistics on the lighting of the city, furnished by the Streets and Lighting Department of the Municipality, from which we extract some particulars.

Most of the Paris streets are lighted by gas supplied by the Paris Gas Company, under a Treaty entered into with the Municipality on Feb. 7, 1870, and expiring on Dec. 31, 1905. The mains laid in the city at the close of 1899 measured 1,629,935 yards; ten years later they had been extended to 1,782,843 yards; while at the end of last year, as stated in the Company's report recently noticed, their length was 1,813,879 yards. More than one-third of these mains are 4-inch. The number of public lamps in use on Jan 1, 1900, was 50,516. The gas supplied for public lighting has to be of such quality that a bengel burner consuming 3·7 cubic feet per hour, at a pressure of 2 to 3 millimetres, gives the light produced by a carcel lamp burning 42 grammes of purified colza oil in the same time. The Municipality pay for this gas 15 c. per cubic metre (3s. 4d. per 1000 cubic feet), or half the price charged to the private consumers. Beyond this they receive 5¼d. per 1000 cubic feet on the total bulk of gas sold by the Company; and, as our readers are aware, they likewise participate to a considerable extent in the profits realized. At the end of the concession, they take possession of the mains without payment. In 1889, the quantity of gas consumed for the lighting of the thoroughfares and the municipal establishments was about 1612 million cubic feet, out of a total of 10,484 millions; but in 1899 the consumption for these purposes only reached 1542 out of 10,700 millions.

The expenses attending the public lighting by gas include: (1) Cost of the illuminant; (2) lighting, extinguishing, and maintenance of the appliances—work which is done by the Company at a charge of 4 c. per day for ordinary, and 6·5 c. per day for high-class lanterns; and (3) the upkeep of special lamps fitted with high-power, recuperative, or incandescent burners. In the following table are given the figures for the years 1889 and 1898; those for 1899 not being available when the table was prepared:—

Year.	Cost of Gas.	Maintenance Charges.			Total Gas and Maintenance.
		Company.	Special.	Total.	
	Francs.	Francs.	Francs.	Francs.	Francs.
1889 . .	4,141,164	1,024,444	55,909	1,080,353	5,221,517
1898 . .	4,107,772	1,249,399	92,568	1,341,967	5,449,739

The Gas Company have to supply certain municipal establishments at the same price as for public lighting. They are divided into two classes: (1) Those which are strictly municipal, and the lighting expenses of which are chargeable to the City; (2) those in which the cost of lighting is borne by their respective administrative departments. Of the latter there are 987, including the Customs, Prefecture of Police, Law Courts, military establishments, departmental buildings, &c.; but there is nothing special to notice in connection therewith. The Company's accounts are sent in, and all that the departmental engineers have to do is to check them. With regard to the former, however, the lighting, extinguishing, and maintenance are done under the superintendence of the Municipality, and by their servants, in accordance with arrangements which will be explained later on. The number of lighting appliances in use in the municipal establishments is considerable, reaching a total of 58,104 when the statistics for the communication were collected. This number was made up as follows: Flat-flame burners, 24,302; burners with chimney or globe, 32,140; high-power burners, 536; incandescent burners, 1126. In the above-mentioned total, schools figure for 35,128 burners; police and fire stations and barracks, for 5572; and the mayoral offices and the public libraries, for 4113. In 1889, the lighting of the various municipal establishments cost 1,461,067 frs. (£58,443); being 1,223,154 frs. for gas, and 237,913 frs. for maintenance. In 1898 the figures were: Gas, 998,504 frs.; maintenance, 249,048 frs.—total, 1,247,552 frs. (£49,902). The marked reduction in expenditure arose not only from economy effected by the adoption of regulators, incandescent burners, &c., but by the substitution in a number of establishments of electric for gas lighting. In certain cases oil is still the illuminant employed; but its use is gradually being discontinued. In 1889, oil lighting cost 38,200 frs. (£1528); whereas in 1898 it had been reduced to 15,331 frs. (£613). At the present time there are only 56 oil-burners in use.

Some of the public lighting of Paris is productive of profit. It is derived from four sources: (1) Advertisement lamps, newspaper kiosks, &c.; (2) private thoroughfares, galleries, passages, &c., thrown open to the public; (3) offices occupied by agents in public buildings, such as town halls, barracks, slaughter-houses, markets, theatres, colleges, schools, &c.; (4) offices occupied by societies authorized to hold their meetings in municipal buildings. The sum paid to the Gas Company for what may be called "remunerative" public lighting in 1889 was 720,000 frs. (£28,800); whereas in 1898 it was 937,000 frs. (£37,480). Another branch of the service which is a source of profit, and which may be conveniently

mentioned here, is the testing and stamping of meters. The number of these instruments in use on Jan. 1, 1899, was 397,039, compared with 211,984 on the corresponding day ten years before. In 1899, there were tested and stamped 71,081 meters, representing a total of 491,145 burners; the amount of the fees received being 44,203 frs. (£1768).

In the course of the past decade, as those readers of the "JOURNAL" who have perused the abstract translations of the annual reports of the Paris Gas Company which have appeared during that period are aware, great improvements have been made in the public lighting of the city. Anterior to 1889, the only burners employed were the ordinary flat-flame, either singly or in groups of six—the latter arrangement being adopted for the lighting of the open spaces where several streets converge. In that year, the number of burners in use was as follows:—

Flat-flames, consuming from 3·5 to 5 cubic feet per hour	49,365
High-power burners (groups), consuming 30 cubic feet per hour	434
Do., consuming 50 cubic feet per hour	1,148
Total	50,947

While, as will be seen, reliance was placed, at the date referred to, upon the flat-flame burner for the lighting of the streets, trials had been made of the regenerative system, 27 lamps having been fitted up. These were found to work so satisfactorily that between 1889 and 1897 there were installed 3442 of them. A further innovation was witnessed in 1894, when a trial was made with 40 Welsbach burners. It was sufficient to bring out the merits of the incandescent gas system; and since that time the number of burners in use has considerably increased.* Other incandescent burners, of the Denayrouze and St. Paul types, have been brought into the service in substitution for regenerative lamps. The number of burners in use in the public thoroughfares in 1899 was as follows:—

Flat-flames (3·5 to 5 feet)	50,110
High-power groups (30 to 50 feet)	51
Recuperative (5 to 42 feet)	3,309
Welsbach (4 to 5 feet)	1,840
Denayrouze and St. Paul	110
Total	55,420

The introduction of the incandescent gas-burner as a light-giving medium necessitated not only a modification of the ordinary method of lighting, but the provision of some appliance to protect the mantle from damage caused by vibration or shock. A collection of lanterns, containing various kinds of burners, and showing how they were fitted up, and the means adopted for lighting and extinguishing them, formed part of the instructive exhibit arranged by the Municipality in the Pavilion of the City of Paris at the International Exhibition last year.

Reference has already been made to the system under which the lighting in the municipal establishments is carried out; and further particulars were promised. It will be convenient to give them here. Down to the year 1884, the lighting, extinction, and maintenance of the lamps employed for the purpose named was in the hands of contractors, who not only neglected to keep the appliances in proper order, but did not exercise any control over the lighting and extinction, having no interest whatever in keeping down the consumption. The result was necessarily an altogether excessive use of gas. The attention of the municipal engineers was first directed to the consumption at the Central Markets, which reached something like 53 million cubic feet per annum; and they came to the conclusion that a change would be advisable. They accordingly put an end to the contract system, and substituted for it municipal management. The outcome was that in four years (1884 to 1887) the cost of gas was reduced from 226,404 frs. to 143,703 frs. (from £9056 to £5748). In view of this favourable result, the system was adopted in some of the principal buildings; and it has been considerably developed. Since Jan. 1, 1891, each of the eight divisions of engineers has been provided with a workshop to which are attached artisans who not only do whatever repairs may be required in connection with the lighting plant, but since 1898 have carried out any new works of this kind which may have been called for. The working staff consists of 10 foremen, 17 plumbers and gas-fitters, 20 assistants, 24 painters, glaziers, &c., and 14 temporary helpers—making a total of 85. In addition, about 80 auxiliary lamplighters are employed, who receive a small payment for the lighting and extinguishing of the burners in the buildings where this work is not done by the staff. The economy resulting from the direct execution of the repairs varies with the nature of the work; but it may be taken to range from 15 to 25 per cent. On new work it averages 10 per cent. The saving thus effected has allowed of improvements being made in the general lighting by the substitution of Welsbach burners of varying powers for the ordinary 5-feet batswing in passages, offices, class-rooms, drawing-schools, and similar places. These, while giving more light, reduce the consumption of gas.

The communication under notice concludes with a few comparative figures in regard to the cost of the public lighting in Paris. Taking first the municipal establishments, the expense of the three illuminants employed in lighting them is shown to be—

	Year 1889.		Year 1898.
Gas	1,461,068 frs.	..	1,247,552 frs.
Oil	38,200 ,,	..	15,332 ,,
Electricity	24,997 ,,	..	710,009 ,,
Total	1,524,265 frs.	..	1,972,893 frs.

or £60,971 in 1889 and £78,916 in 1898. The increase arises, in the first place, from the fact that since 1889 the municipal establishments have very considerably augmented; and, in the second, from the substitution, in a number of places, of electricity for gas—the former being a more costly illuminant. With regard to the street lighting, the total expenditure it has entailed in various periods of the past century is shown in the following table:—

Period.	Francs.		Sterling.
1821 to 1833	8,400,000	..	£336,000
1834 ,, 1846	13,300,000	..	532,000
1847 ,, 1859	19,700,000	..	788,000
1860 ,, 1872	38,800,000	..	1,552,000
1873 ,, 1885	50,600,000	..	2,024,000
1886 ,, 1898	72,000,000	..	2,880,000

But while the expenses have increased, the plant and the lighting have unquestionably been improved. Proof of this is afforded by the fact that, by the employment of the incandescent gas system and electricity, the total light-giving power of the appliances in use in the streets, which in 1889 was only about 725,000 candles, on Jan. 1, 1899, was equal to 1,394,000 candles. The value of the lighting plant (lamps and standards) in position in the public thoroughfares on the last-named date was about £340,000.

* We learn from the current number of "Le Gaz" that the Municipality have decided to still further extend the system; contracts having just been entered into with two Parisian firms for the alteration of 25,000 lanterns for the reception of incandescent burners, and for the supply of this number of mantles.—ED. J.G.L.

WATER GAS AND OTHER COMBUSTIBLE GASES.

By Herr JOH. KÖRTING, of Hanover.

[Abstract Translation of a Communication to the Association of German Engineers.]

(*Concluded from p. 1311.*)

Dowson or Power Gas.

Exact researches by Dr. F. Fischer showed that, using English anthracite, having a calorific power of 3538 calories per pound 76·9 cubic feet of gas were produced per pound of fuel. The gas had a calorific value of 38 calories per cubic foot. This indicates that 82 per cent. of the heating value of the fuel is utilized. The duty becomes higher in consequence of improvements made; but reliable figures as to the increase are wanting. Practical results show that from 1 lb. of carbon 80 cubic feet of gas, having a value of at least 35½ calories per cubic foot, are produced; and that therefore coke having a calorific power of 3175 calories per pound, will yield about 69·7 cubic feet of such gas. This corresponds to an efficiency, or relative utilization of the heat of the coke, of 78 per cent. A steam-jet air-blast is used; and thus the propelling force of the steam is directly utilized for driving in the air used to maintain the combustion. This is not the case with the water-gas process; and in this respect the Dowson system effects considerable economy of steam compared with the other method. Prolonged and exact determinations, made on the large plant belonging to the firm of Körting Bros., show that the fuel used in producing steam amounts to one-ninth of the amount employed in the producer. Hence, for the production of 69·7 × 35·5 = 2475 calories in the gas, there are expended 3175 + 355 = 3530 calories in fuel. This gives an efficiency of 70 per cent. Taking the price of the coke at £1 0s. 4d. as before, the cost of 1000 cubic feet of the gas will be 1⅜d., and the cost of 1000 calories from it about 0·053d.

Summary.

The table given on p. 1378 includes the results found in the course of this communication for the different types of gas, taking the fuels used on the common basis already adopted. The cost of raising the heats and of odorizing the gas has, however, been included in the case of water gas. The cost of applying the gas for lighting purposes—both with ordinary and incandescent burners—is also added, from earlier results. It is very desirable that the figures here brought together should be completed and supplemented from practical results.

This inquiry has disclosed certain facts, among which are the following: At the prices fixed for the raw materials—which prices represent the normal state of the market in Northern Germany—if the price of the fuel alone is taken into account, simple water gas is not in general superior to coal gas, as even the incandescent light is not maintained more cheaply with water gas than with coal gas. Of course, a change of prices may quite alter these relations; and hence a separate calculation should be made for the conditions prevailing at each place. This can readily be made on the lines indicated in this communication. The coal-gas data relate to careful observations extending over years; while the data for water gas are derived from comparatively few results which need corroboration. Water-gas engineers should make it their business to collect reliable data from prolonged working of plant in order, if possible, to refute the somewhat unfavourable results recorded. The effect of the principal other charges on the different kinds of gas may be briefly considered. These charges are the cost of plant and wages.

Tabular Summary.

	Calorific Value.	Relative Utilization of the Calorific Value of the Fuel, or Efficiency.		Cost of Production from the Fuel.				Cost of 1000 Candles (English). [Water gas made odorous, and cost of raising heats included.]	
				Omitting Fuel Used in Raising Heats and the Cost of Imparting Odour to the Gas.		Inclusive of Fuel Used in Raising Heats, and the Cost of Imparting Odour (where required).			
	Calories per Cubic Foot.	In the Generator only.	Including Boiler Fuel.	Per 1000 Cubic Feet.	Per 1000 Calories.	Per 1000 Cubic Feet.	Per 1000 Calories.	Flat-Flame Burner.	Incandescent Burner.
		Per Cent.	Per Cent.						
TRIAL RUNS.									
OLD WATER GAS PROCESS—									
Producer gas not used	75·2*	43·0	37·5	..	..	..	..	..	..
Producer gas used—									
Water gas sole object	18·1†	..	59·0	..	..	..	..	..	..
Do. and producer gas wanted		85·0	74·0	..	..	..	..	..	..
DELLWIK'S PROCESS—									
According to Prof. Lewes	70·8	..	82·0	..	..	..	..	..	..
,, ,, Dr. Bunte	70·8	72·0	63·0	..	..	..	..	..	..
STRACHE'S PROCESS (his own trials)—									
Using gas coke	70·8	78·0	60·0	..	..	..	..	..	..
Using Upper Silesian coal	70·8	69·0	58·0	..	..	..	..	..	..
Using Buchberg lignite	70·8	52·0	42·5	..	..	..	..	..	..
DOWSON OR POWER GAS—									
According to Dr. F. Fischer	38·0	82·0	73·0	..	..	..	..	..	..
PRACTICAL WORKING.									
HUMPHREYS AND GLASGOW'S PROCESS—									
According to Dr. Hipper—				s. d.	d.	s. d.	d.	s. d.	d.
Simple water gas	70·8	..	55·0	0 4·43	0·062	0 6·02	0·085	..	0·48
Carburetted to 14-candle power with German oil	141·6	..	..	1 0·93	0·091	1 1·60	0·096	0 5·13	1·01
Do. with other oil (in Germany)	141·6	..	..	1 8·40	0·144	1 9·08	0·149	0 7·80	1·50
DELLWIK'S PROCESS—									
According to Königsberg results—									
Simple water gas	66·5	..	51·0	0 4·25	0·064	0 5·64	0·085	..	0·47
Carburetted to 14-candle power with benzol	104·8	..	..	1 3·13	0·144	1 3·71	0·149	0 6·02	1·16
Do. with German oil	141·6	..	..	1 1·74	0·096	1 2·31	0·104	0 5·47	1·05
STRACHE'S PROCESS—									
Simple water gas (Pettau results)	70·8	..	35·0	0 6·12	0·086	0 7·62	0·108	..	0·61
Carburetted to 14-candle power with benzol	104·8	..	..	1 5·00	0·162	1 5·68	0·168	0 6·70	1·29
Do. with German oil	141·6	..	..	1 2·62	0·103	1 3·20	0·108	0 5·75	1·11
Simple water gas (other practical results)	70·8	..	30·5	0 6·29	0·089	0 7·85	0·119	..	0·64
COAL GAS—									
Illuminating gas sole object	141·6	..	33·5	..	..	0 6·44	0·046	0 2·44	0·47
Do. and bye-products wanted	141·6	..	66·0	..	..				
Mixed coal and water gas (all the coke gasified)	92·7	..	..	..	..	0 5·36	0·058	[?]	0·58
DOWSON OR POWER GAS	35·5	78·0	70·0	0 1·73	0·053	..	..	..	..

* Water gas. † Producer gas.

As regards the plant, a Dowson gas plant is incontestably the cheapest. A water-gas plant needs both a large boiler and an engine for driving the fans, as well as apparatus for alternating the working; whereas a Dowson plant needs only a small boiler and no engine. The difference in cost is therefore very great. For instance, a water-gas plant for power purposes only, and consequently of the simplest type, costs about four times as much as a Dowson plant.

It is more difficult to compare the cost of a water-gas installation with that of coal-gas plant. Dr. Leybold mentions five times that of the former for the cost of the latter; but this figure has been disputed. It would make coal-gas plant twenty times as dear as Dowson gas plant. An instance known to the author does not bear out Dr. Leybold's estimate. A water-gas installation (making simple water gas), comprising two generators each of about 3500 cubic feet per hour productive capacity, and therefore capable of making together about 170,000 cubic feet per diem, was erected at the same time as a coal-gas installation of 24 retorts, which would give about the same maximum output per diem. Both were erected by the same firm and in the same town, and were designed for a make of about 14 million cubic feet per annum. Now 170,000 cubic feet of water gas have not the same value as 170,000 cubic feet of coal gas; and hence doubt might quite properly be expressed as to whether the two installations ought actually to be regarded as of equal capacity. But putting this point aside, the subjoined figures show that the relative costs of the installations were very different from the estimate that is referred to above.

	Water-Gas Installation.		Coal-Gas Installation.
On Manufacturing apparatus	£4,050	..	£3,850
,, Gasholder, 28,000 cb. ft. capacity	1,450	..	..
,, 70,000 ,, ,, ,,	..	..	2,000
,, Land [at 1½d. per square foot]	100	..	400
,, Levelling	50	..	175
,, Shooting gravel on gasholder site	25	..	50
,, Distributing mains	4,500	..	4,500
,, Buildings for plant	925	..	2,400
Totals	£11,100	..	£13,375

A questionable item is the cost of mains, which has been put at the same figure in the two cases. For even supposing that a higher pressure is employed in the case of the water gas, in order to pass the same quantity through the same mains, it is essential to consider whether the necessity for the use of galvanized or asphalted mains would not enhance the cost. This consideration, in conjunction with the aforementioned doubt as to whether the water-gas installation is of the same effective capacity as the coal-gas plant, must lead to the conclusion that the actual difference in the cost of the two installations is practically negligible. This conclusion differs so greatly from other statements on the question, that it is clear the real relations of the cost of one plant to that of the other needs thorough investigation and elucidation.

Views with regard to wages likewise differ very greatly. Herr Dicke, in his book on the Dellwik process, gives 0·37d. as the wages paid per 1000 cubic feet of water gas. On the other hand, Mr. Botley gives 1·7d. At Pettau, the wages work out at 4·8d. per 1000 cubic feet. For the purposes of this comparison, they will be taken at 4d. per 1000 cubic feet, on the assumption that one foreman and two men are employed to work plant of the size under consideration. Now for coal-gas plant of the same capacity, the wages may be fairly taken at 6½d. per 1000 cubic feet, though at German works of about three times the capacity they average only about half this figure. But similarly a larger water-gas installation would show a reduction in the wages per 1000 cubic feet made. As to how great this reduction would be, exact particulars from practical results appear to be wanting. The wages for Dowson gas are somewhat lower than for water gas, owing to the fundamental difference in working the plants; the water-gas process being an alternating one, and the Dowson gas process a continuous one. The Dowson gas plant at Körting Brothers' works, which, working for ten hours, makes annually more than 210 million cubic feet of gas, requires only one stoker and one coke man. The wages in that case amount to less than 0·15d. per 1000 cubic feet.

After all has been said, the author thinks that the following conclusions may be drawn, so far as the present state of gas manufacture (in Germany) is concerned: For a special plant for use only for power purposes, water gas cannot at present displace Dowson gas. The latter has the advantages of affording a higher duty from the fuel, of simplicity of manipulation, and of cheap plant. For providing a very high temperature for industrial purposes, water gas occupies the premier position, and in many cases cannot be displaced by any other gas. For lower temperatures, however, Dowson gas has the advantage, for the reasons already indicated. In either case, the temperature attainable may be considerably increased by the use of a hot blast.

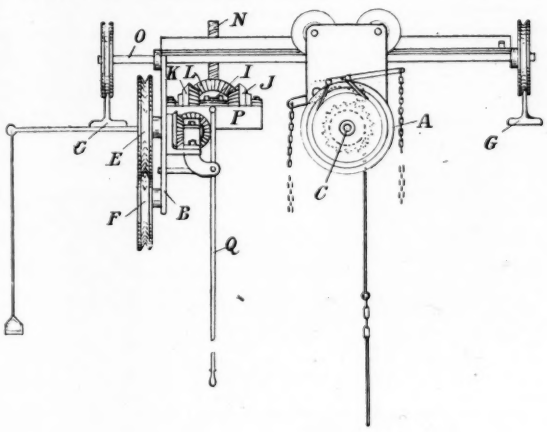
With regard to the lighting of towns, coal gas still deserves the confidence hitherto reposed in it; and it must be considered as out of the question that either simple or carburetted water gas can displace it under prevailing conditions. Its great advantage lies in its numerous valuable bye-products. Only in a few special cases will water gas show to greater advantage. On the other hand, water-gas plant can serve as a useful auxiliary to existing coal-gas plant under some conditions—viz., (1) When difficulties arise with the workmen; as water-gas plant can, if necessary, be worked by an unskilled staff of men. (2) When the management have delayed enlarging the coal-gas plant sufficiently to meet requirements, until it is too late to do so. (3) When the available

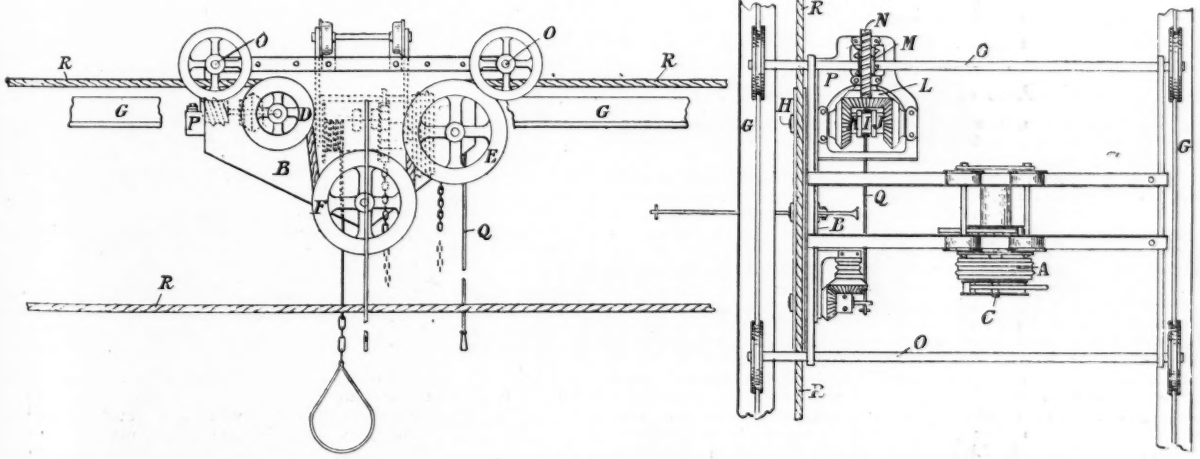
site is too small for coal-gas plant. (4) When coke is fetching very bad prices.

The increasing necessity for avoiding soot and smoke in towns, the greater degree of perfection of coke-stoves, and the increasing employment of Dowson or power gas plants, constantly enlarge the sphere of usefulness for gas coke; and where coke is found to still fetch bad prices, it will be more advantageous to promote the introduction of these applications of it than to employ it for the production of water gas.

INCREASING THE SCOPE OF THE "RAPID" CHARGING APPARATUS.

About three years ago, Messrs. Biggs, Wall, and Co., introduced to the gas industry a simple form of manual charging apparatus, under the name of the "Rapid." Time has proved the utility of this machinery; and to-day we find that some of the more important works where it has been adopted are, after full and fair trial, receiving further installations. This being so, there is





no necessity for us to withdraw anything that was said in regard to the apparatus at the time of its introduction. Success has encouraged improvement; and this improvement has raised the machinery to a higher level of usefulness, so that now, instead of being limited (as the old type is to small and medium sized works), the apparatus, as it is now being constructed to work by power, will compete for place and recognition in works of almost any magnitude. But the *raison d'être* of this raising of the status of the machinery is to be found in the human desire, when once the sweets of labour-saving devices are tasted, to have laborious exertion eliminated from one's work to the utmost extent. With the original "Rapid" manual charging machine, the heavy task of lifting scoops containing 2 cwt. of coal to different heights, was considerably alleviated, as all that the stokers had to do was to raise and lower their scoops by the hand operation of a chain on a drum-shaft. While thankful for the amelioration of their lot to this extent, stokers have not been slow to recognize that, if the raising of the scoops could be performed by some other means than the working by hand of a chain, the labour required of them would be still further lessened. Thus it has come to pass that arrangements have been evolved whereby the apparatus can now be operated by steam, gas, hydraulic, compressed air, or any other form of power; and this (as already said) gives to the "Rapid" charging machinery a wider scope for application. Endless ropes or chains and friction-wheels, replacing the old chain wheel and chain on the drum shaft, are the means by which the scoops are raised and lowered, and the apparatus moved from bed to bed without hand labour.

We give lettered drawings in order to plainly convey to our readers the features of the improvements which have been effected. As just mentioned, the chain-wheel and chain on the drum shaft have been replaced by a friction-wheel. This wheel is indicated by A in the illustrations; and it may be of any size and section. A frameplate B of convenient size and shape is fixed at one end and side of the machine, and attached to it are two rope-driving pulleys D E, with a suitable guide-pulley F. A driving-pulley D enables the machine to be propelled to and fro on overhead tramrails; and for this purpose it is keyed or fixed on a spindle or axle passing through the frameplate with suitable bearing attached. On the other side of the frameplate is fixed, on the spindle or axle, a sliding clutch or cone I, working loosely on a midfeather on the spindle. At the ends of the clutch are fixed two bevel-wheels K and J running loosely on the same shaft; and at right angles to these and connecting them is a third bevel-wheel, keyed or fixed on a separate shaft. On this shaft is a worm M, which engages in a tangent-wheel on one of the travelling axles of the machine. The whole of this gearing is carried by a suitable bracket bolted to the frameplate. The sliding clutch is actuated by the lever Q, fixed within convenient reach of the operator.

The method of working the gearing is very simple. The pulley D is driven by a rope R, and the motion is transmitted through the spindle to the friction-clutch I. When it is desired to propel the machine in a forward direction, the friction-clutch I is pressed by means of the lever Q against one of the bevel-wheels K and J. This immediately revolves in a similar direction, and transmits its motion through the bevel-wheel and worm M to the tangent wheel fixed on the travelling axle of the machine, and the machine travels forward. When the machine is required to travel in the reverse direction, the friction-clutch I is simply made to engage in the opposite bevel-wheel, and the motion is thus reversed.

The rope-driving pulley E is for working the lifting gear; and for this purpose is keyed on a spindle or axle passing through the frameplate with suitable bearing attached. At the opposite end of this shaft is fixed a bevel-wheel, which engages into another bevel-wheel working at right angles to itself on another shaft. Fixed on this shaft also is a serrated or other form of friction-wheel of the same section as the friction-wheel A, on the drum-shaft, and so fixed that, when the lifting carriage is pulled back into position for lifting, the two friction-wheels intimately engage each other—perfect contact being ensured by the actuating lever. The weight of the scoop and charge is sustained by a pawl; but there is in addition a hand brake on a drum, so that when the pawl is released, the weight is supported by the brake and gently lowered.

The method of working the lifting gear is as follows: The rope pulley E is driven by the rope R; the motion being transmitted by shaft and bevel wheels to the friction-wheel. The lifting carriage is brought into position for lifting; and the actuating lever (the opposite end of which is quadrant shaped, and, when the lifting carriage is in position, engages it by one of its cross-stays) is pulled down, and the friction-wheel is brought into intimate contact with the friction-wheel A, and made to revolve —the load being lifted, and then dealt with, as by the old type of the "Rapid" apparatus.

We think that to the engineer this description, aided by the drawings, will convey, without further explanation, a sufficiently explicit idea of the new method of working this charging apparatus. The inviting features of the machine are its absolute simplicity and its capability of rapidly executing the work for which it has been designed. At the same time, it should be mentioned that the manufacturers have not devised this power machine with a view to entirely supersede the manual apparatus, but to meet the requirements of larger works. A machine as described has been successfully operating at a gas-works since October last year without the slightest hitch

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

The Air Supply to Incandescent Burners.

SIR,—With reference to the article on the above subject in yesterday's issue of the "JOURNAL," in which you say you do not remember having seen any reliable photometrical tests with lateral air-supply chimneys, I have pleasure in sending you the results of some I made a short time ago. The tests were made with (A) the ordinary clear-glass 9-inch chimney; (B) the 6½-inch "Domestic" chimney, with six ½-inch holes, arranged to come opposite the head of the burner (with this chimney a brass air-diverting cone is used, slipped over the burner-head, so excluding air from reaching the mantle except through the holes in chimney); and (C) the "opaline" globe, made of white opal glass, and almost pear-shaped—an air-diverting cone being also used. The same mantle was employed in each series of three tests; but a fresh one was put on for the respective series:—

No. of Test.	A. Candles.	B. Candles.	C. Candles.	
1	50	70	52	
2	48	66	48	
3	51	70	52	per 3½ cubic feet.
4	54	72	54	
5	46	70	48	
6	52	66	52	

The averages work out as follows:—

A.	B.	C.
50·01	69	51

which shows an increase, in the case of "B," of 37·97 per cent. over the ordinary chimney.

The opaline globe gives practically the same result as the ordinary chimney, but it likewise diffuses the light; so that you have the advantage of a globe without the consequent loss of light.

INTERESTED.

May 15, 1901.

The Make of Carburetted Water Gas at Southall.

SIR,—We notice in the discussion following Mr. Butterfield's paper on "Carburetted Water Gas," as reported in your last issue, that a question arose as to the actual make of our Southall plant on the day his observations were taken. As this is a rather important factor, we shall be glad if you will allow us to say that the Company's Engineer, who had at the time no knowledge of Mr. Butterfield's visit, has been good enough to refer to the records for the day in question; and he informs us that the make was equal to 681,000 cubic feet per set, the guaranteed nominal capacity of the plant being 600,000 cubic feet.

S. CUTLER AND SONS.

Millwall, E., May 17, 1901.

The Price of Gas in the Metropolis.

SIR,—I should like, with your permission, to offer a few observations on the above subject, in view of the decision of the Select Committee on the South Metropolitan Gas Bill.

Taking first the proviso in regard to the reduction of the Gaslight and Coke Company's standard price from 3s. 9d. to 3s. 6d. per 1000 cubic feet, its effect, at the present "selling" price of 3s. 5d., is to penalize the Company's dividend to the extent of 5s. 4d. per cent.—it reduces it from £4 8s. to £4 2s. 8d. per cent. The Company can only regain this by gradually reducing the selling price. When this reaches 2s. 9d., they regain their present dividend rate. As the price of gas falls below 2s. 9d., so the Company gain in the ratio of 8d. per 1000 cubic feet beyond what they would get under the existing standard. This is because 2s. 8d. is given them as dividend for every penny on the selling price, instead of 2s. under the existing arrangement. At a standard price of 3s. 5d., they would lose 8s. at the present selling price; at 3s. 4d., they would lose 10s. 8d.; and at 3s. 3d., they would lose 13s. 4d. The effect of these low standard prices would be to make the Company reduce their selling prices to gain the 2s. 8d. on every penny. This is what Mr. Livesey calls "taking it off the top and putting it on the bottom."

With regard to public lighting, the minimum of 2s. 8d. per 1000 cubic feet is a "top" price, and may never be reached by the South Metropolitan Company again. Therefore, from a local authority's point of view, it is unfair—especially as Mr. Livesey has publicly promised to reduce the price of gas by 2d., if not more, next month, bringing it at least to 2s. 6d.; so that we should be at once paying more by at least 2d. for gas for public lamps than we ought under the 1883 agreement.

A LONDON CITIZEN.

May 17, 1901.

Are Experts' Reports Confidential?

SIR,—The report of the action *Clarke v. Dibdin and Thudichum* in your last issue contains several inaccuracies, two being injurious to me, so I desire to say: (1) The letter dated March 18, 1901, covering the report I sent back to the defendants, contained this request: "Please exchange report returned herewith for one without duty corrected to 16-candle power gas." (2) I wrote defendants on March 19 as follows: "I offer, without prejudice, to return your report if you return £2 12s. 6d." (3) Judgment was—Damages, 1s.; costs, 3s. The word "farthing" was not mentioned by anyone.

ARTHUR CLARKE.

Albion Road, N., May 16, 1901.

[With reference to our correspondent's third statement, the word which he says was "not mentioned by anyone" is in our reporter's transcript, and it appeared in the report of the case given in other publications.—ED. J.G.L.]

REGISTER OF PATENTS.

APPLICATIONS FOR LETTERS PATENT.

8747.—ROUGH, F., and GREATHED, E. A., "Carburettors." April 29.
8762.—STRATHY, F. R. L., and RILEY, A. J., "Acetylene gas lighting." April 29.
8776.—BOULT, A. J., "Gas-motors." A communication from E. Caillavet. April 29.
8814-5.—KAEFERLE, F., "Pressure-reducing apparatus." April 29.
8817.—BOULT, A. J., "High-pressure incandescent gas lighting." A communication from the Société Lumière Boule. April 29.
8820.—BEALE, B. R., and BAGNALL, A. E., "Gas-meters." April 29.
8877.—GRAHAM, M., "Hot coke conveyors." April 30.
8881.—JOHNSON, C. J., "Manufacturing gas." April 30.
8887.—MAYER, F. J., "Gasholders." April 30.
8894.—GOLBY, F. W., "Self-closing cocks or valves." A communication from S. A. S. Hass. April 30.
8905.—D'ALTOFF, L. T., "Manufacture of gas." April 30.
8969.—THORP, T., and MARSH, T. G., "Automatically indicating and recording the percentage of carbon dioxide in water gas." May 1.
8972.—GRAHAM, M., "Gas producers and furnaces." May 1.
8973.—PHELON, J. C., and RAYNER, H., "Gas and like engines." May 1.
9012.—KITTO, W. H., "Internal combustion engines." May 1.
9097.—BORCHARDT, H., "Electrically controlling and igniting and extinguishing gas from a distance." May 2.
9105.—SHONE, W., "Gas engine." May 2.
9171.—EHMANN, C. P., "Incandescent gas-burners." May 3.
9175.—BOOTH, J., and DUGARD, W. F., "Gas-lamp eye-screens." May 3.
9222.—FISCHER, J., "Incandescent gas-burners." May 3.
9224.—HOOKHAM, G., "Incandescent gas mantles." May 3.
9240.—BLAKE, M., and SMART, R. H., "Charging inclined retorts." May 4.
9246.—WIGLEY, P., and ARCULUS, E. A., "Incandescent gas-lamps." May 4.
9319.—BURTON, T., "Obtaining an adjustable admixture of air and gas." May 6.
9321.—TULLY, C. B., "Manufacture of water gas." May 6.
9331.—LANGHANS, R., "Incandescent mantles." May 6.
9460.—MISSIRE, F. & M. L., "Mantles for incandescent gas-lighting." May 7.
9467.—HUTSON, W. D., "Gas-ranges." May 7.
9468.—JENKS, A. L., "Mantle-supports." May 7.
9513.—LEGGE, J. ST. C., "Carburetting air." May 7.
9542.—PRICE, E. "Carburettor." May 8.
9551.—SAUBERMANN, S., "Incandescent bodies for gas-lamps." May 8.
9622.—BOND, E. S., "Internal combustion engines." May 9.
9643.—HANCOCK, W., "Atmospheric gas-burner." May 9.
9645.—JACKSON, I., "Gas-stoves." May 9.
9650.—SCHMIDT, M., "Contrivances for lighting purposes." May 9.
9654.—GOULD, I., and DIXON, G., "Cooking stoves." May 9.
9658.—KENNEDY, F. S., "Incandescent mantles." May 9.
9660.—STEVENS, J. H., "Self-intensifying gas apparatus." May 9.
9661.—STEVENS, J. H., "Gas-stoves." May 9.
9664.—SCHMITT, F., "Generating acetylene gas." May 9.
9733.—DICKSON, W. K. L., "Mantles for incandescent gas lighting." May 10.
9818.—ALTMAN, J., "Incandescent gas lighting." May 11.
9825.—HOLCROFT, C., "Regenerative furnaces and gas-producers." May 11.

Water-Works Extension at St. Helens.—Last Thursday week, a Local Government Board inquiry was held at St. Helens by Mr. H. P. Boulnois with reference to an application by the Corporation for permission to borrow £5000 for water-works purposes. It was stated by the Town Clerk (Mr. G. W. Bailey) that the outstanding debt on the water undertaking was £120,887. In 1896 the Corporation received sanction to borrow £7000, which had been spent on the extension of mains in consequence of the building of new property. In addition, £324 had been expended up to March 31, 1900, and now they required £5000 for the estimated expenditure on the laying of mains for the next five or seven years—this being based on the estimate of the growth of the borough. There was no opposition.

Water-Works for Willesborough.—In the presence of a large and representative company, Mrs. Wickham, wife of Dr. Wickham, opened the new water-works which have just been completed for the supply of Willesborough. They have been carried out by Messrs. Bailey Denton, Son, and Lawford; and the last-named gentleman gave some interesting details connected with the work. He explained that the boring went down through the gault clay, and through the Folkestone and Sandgate beds, into the Hythe bed. They chose the latter because the water from it was of better quality than that from the other beds. The ground on which the company were standing was 190 feet above sea-level, and the bottom of the borehole went down to that level, while the bottom of the well and adit was 50 feet below the surface of the ground. The water was pumped from the well to the standpipe on the road higher up, the top of which was 247 feet above sea-level, and practically commanded the greater part of the Union. From there the water would flow by gravitation to the reservoir at Willesborough, where the whole parish could be supplied by the same means and without further pumping. The two engines in the house were each of 12 brake horse power, and each was capable of raising a volume of 140 gallons per minute to a height of 172 feet. The rising main, of course, took double this amount; and, if necessity arose, the two engines and pumps could give a supply of 201,600 gallons of water in 12 hours—or 20 gallons per head for a population of 10,000. The capacity of the reservoir, which was 10 feet deep, was 100,000 gallons. The cost of the works was about £11,000, and there were 9 miles of mains.

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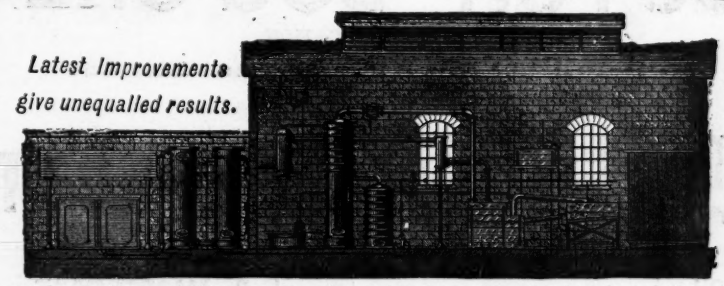

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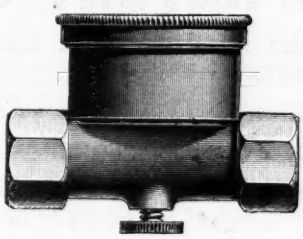

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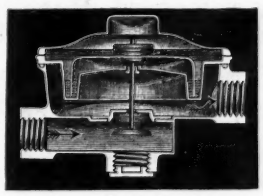

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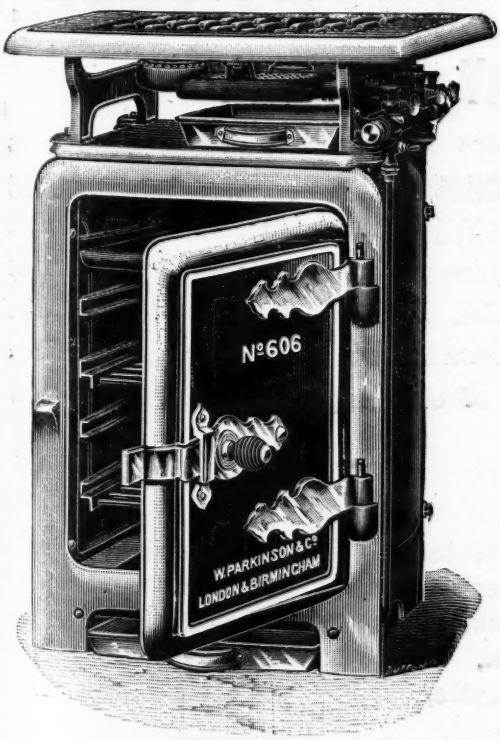

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PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

Pressing Forward. There has been quite a poverty of gas business in the Committee rooms during the past week; the only measure which was considered and passed on its way being that of the Elland Gas Company. The clauses in the South Metropolitan Gas Bill were adjusted on Tuesday; but they created no difficulty. On Friday, Colonel Welby and his colleagues trimmed the Mond clauses, and put the Bill into order for reporting for third reading. The Barrow Water Bill was passed forward by Lord Jersey's Committee; and another Committee of the Upper House all but disposed of three measures dealing with the Burn watershed. The work of the Committees who are now sitting has thinned down to such an extent that in all probability they will clear their lists before the Houses rise for the Whitsun recess. It has already been observed in these notes that the work of the Committees is being carried through with remarkable rapidity; and the same thing has been noted in the Press by other frequenters of the lobbies. The exceptional pressure in clearing off the Private Bills is connected with rumours which are current as to the likelihood of an autumn session of Parliament.

Mond Again. Only two or three points cropped up during the consideration of the clauses of the Mond Gas Bill which need be brought into notice here. A provision has been inserted prohibiting the Company supplying any person with a less quantity than a million cubic feet of gas in a year. Then the Committee had a feeling that the evidence proved that, when the price of slack went up, the benefit would be greater to the Company than to the consumer. The Committee thought, if this would be the case, it ought to be equally adjusted between the Company and the consumer. An amendment was therefore made so as to give the Board of Trade power to adjust the price of the gas in a manner that would carry out the views of the Committee. A new clause was also inserted giving power of action to the Board in case of the default of the Company after the expiration of four years from Jan. 1, 1902.

A Patched-Up Case from Elland. The Elland District Councillors may be very estimable gentlemen for aught we know; but they certainly made a pitiful exhibition both in the petition with which they approached the House of Lords, and in the case which they laid before Lord Pirbright's Committee last week, in opposition to the Gas Company's Bill. They have been making advances for purchasing the Company's property; and, being unsuccessful, they launched a petition against the Company, in which they prefaced a request for a purchase clause by a mass of paltry accusation and solicitation. But the District Councillors now find that they have over-reached themselves; for certainly the little concession which they obtained from Lord Pirbright's Committee will not justify even the expenditure on the railway fares of the representatives of the Council who came up to London to harass the Company, let alone the costs, legal and otherwise, incurred in prosecuting their case in Parliament. And if they reflect that they might have obtained more by agreeing with the Company in Elland without appearing in Parliament, their feelings will be somewhat bitter. It would be interesting to learn who advised these confiding councillors to insert in their petition a clause asking for provision being made in the Bill for the transfer of the undertaking, when, as Mr. Balfour Browne says, such a clause has never been put upon any statutory company. This the astute Counsel for the petitioners (Mr. Lloyd) also readily admitted; and he very wisely declined to waste time in pursuing it. But he asked instead for the insertion in the Bill of what has come to be known as a "sterilization clause"—in other words, that a limitation should be placed upon the expenditure of capital until next session, so as to enable the Council and neighbouring authorities to decide whether or not they shall come to Parliament for powers of purchase without enhancement of the value of the concern in consequence of the passing of the Bill. This, very properly, the Committee would not entertain. All through the proceedings, it was palpable, Counsel for the petitioners and his technical advisers were weighted by the impotency of their case. It was, to say the least, curious that the witnesses who had been retained were not called to support the petition.

The Elland Company have in the gas industry the reputation of being one of the best managed in Yorkshire; and therefore Mr. Robert Porter, the Engineer, appeared in the Committee room with the utmost confidence. Had it been necessary, Mr. Corbet Woodall and Mr. Thomas Newbigging were prepared to testify to the good conduct of the Company; but it would really have been waste of time to have occupied their Lordships with more evidence than that of the Chairman of the Company (Rev. Mr. Aspinall) and of Mr. Porter. The Company asked for £45,000 of additional capital, with one-fourth loan; and for power to convert their capital to a uniform basis. The opposition, in their petition, complained of the manner in which the Company exercised their powers in opening the roads, of the bad quality of the gas, of the improper application of the reserve and insurance funds, of not deducting income-tax from the dividends declared, of making extensions out of revenue, of keeping large floating balances, of delaying application to Parliament for capital powers, of the standard price of 4s. being excessive, and of the standard of illuminating power and pressure being too low. The petitioners asked for provisions dealing with these various matters, and among others for power to test the pressure at any lamp-post without notice to the Company.

It is unnecessary here to refer to more than two or three of these matters. First, as to the complaint of "bad" gas, this is not to be wondered at, if what we hear is true—that the Council are so parsimonious in respect of public lighting that they limit the consumption of gas by the street-lamps to 3 cubic feet per hour. Regarding the investment of the reserve and insurance funds in the undertaking, it may be explained that the Company's old Provisional Order stated that they might, if the profits exceeded the amount required to pay the standard dividend, utilize the balance in forming a reserve fund. But the Company have never allowed the works to make more than would pay the standard dividend; and it has, in fact, never been paid. Instead, the so-called reserve fund was formed out of monies which might have been distributed as dividend; and consequently the "reserve fund" did not come under the ordinary clauses. Therefore it cannot truly be said that the Company have sinned in this respect. However the present Bill as it now stands provides for the reserve being invested in securities outside the Company. Seeing that the full statutory dividends have not been declared, there is little point about the question as to income-tax. Regarding the standard price of 4s. being excessive, no alteration has been made by their Lordships in this. The Elland Councillors may now remember to their chagrin that the Company offered in previous negotiations in connection with the Bill, to reduce the standard price to 3s. 8d.; and it may be that it would not have been a very difficult matter, to save the expense of a fight in Parliament, to have got them to concede a further 2d. Respecting the additional capital of £45,000, the Lord Chairman of Committees had restricted the amount to be raised as preference shares or stock to one-half; and during the proceedings the Company agreed that the remaining £22,250 should be raised as ordinary capital under the auction clauses at 5 per cent., without the application of the sliding-scale. The Committee would not allow the Council power to test for pressure without notice. So that altogether this ambitious body have netted little by their visit to London. It is stated that they may apply to Parliament next year for powers of compulsory purchase. If they do not wish to court a worse defeat than on this occasion, they will stay away. Someone who has the ear of the Council would act the part of a good friend by informing them that a case of compulsory purchase of a gas-works has never yet succeeded in passing through Parliament, and that much heart-burning and expenditure of time and money has been occasioned in the fruitless effort to get one through.

Bradford's Maw and Shipley's Rights. In the Bill which that octopus body the Bradford Corporation have before Parliament for general powers, was a section proposing the inclusion of Baildon in the borough. Baildon is within the area of the Shipley Gas Company, who have agreed to sell their undertaking to the District Council; and this authority have a Bill in Parliament in which they seek confirmation of the transfer and agreement. It thus came about that when the Baildon section of the Bradford Bill was reached by Mr. Heywood Johnstone's Committee, both the Shipley Gas Company and the District Council appeared in opposition, for the purpose of obtaining protection. The promoters declared that it was not their intention to injure the Company; but they would not consent to a protective clause, in view of the understanding entered into for the sale of the undertaking to the Council. The Committee, however, found that the preamble of the Bill was not proved so far as the extension to Baildon was concerned. An application was made for the granting of costs to the Gas Company; but the Committee rejected it—presumably on the ground that they could not find unreasonable or vexatious action on the part of the Bradford Corporation. If the Baildon section of the Bill had gone through, it is not at all clear that Bradford would not have been able to compete there with the Shipley people for gas custom. Mr. Thomas Newbigging was present looking after the interests of both the Gas Company and the District Council.

Barrow Water Scheme. There has been a considerable amount of fighting over the Barrow-in-Furness Corporation Water Bill before Lord Jersey's Committee, and some four sittings were required to hear the mass of evidence. The protection of private interests formed a large element in the opposition; but the promoters, by their scheme, had not, it seems to us, been at all unmindful of what was due to those who might, without such regard, have suffered from the proposed new operations. The opponents were the Hodbarrow Mining Company, the Millom Iron Company, and the Millom District Council. The project of the promoters is to take water from the River Duddon at a point 17 miles above the town. The Corporation asked to be allowed to appropriate 2 million gallons a day when the flow of the river is more than 5 million gallons; when the flow is less than 5 millions, the excess of 3 millions; when the flow is 15 million gallons, then 3 millions; and when the flow is less than 3 millions, the Corporation would extract no water at all. In this case, they would come upon their reserve in Seathwaite Tarn, where the level of the water is to be raised by a masonry dam some 21 feet high. The overflow it is intended to turn into the river; and this would meet all cases when the natural flow of the river is less than 3 million gallons daily. Under the scheme, there would be a storage reserve of 275 million gallons over and above the present capacity of the tarn; and the Corporation propose to take 175,000 million gallons from the existing capacity then required. Thus storage would be exclusively reserved for raising the flow of the river to 5 million gallons daily in times of drought; so that the Corporation would be enabled to extract the 2 million gallons. The Companies who opposed contended that their interests would be imperilled if there was any diminution of the flow in the River Duddon; but a great deal of evidence was produced by the promoters to show that this was illusory, and that the operations of the Corporation would have the effect of equalizing the flow. The opposition of the Millom District Council was on the ground that the valley of the Duddon was the natural source of additional supply for their district. Among the witnesses for the Bill were Mr. W. Fergusson (the Manager of the Corporation Gas and Water Departments), Mr. W. H. Fox (the Borough Engineer), Mr. George H. Hill, and Mr. James Mansergh; while Mr. Charles Hawksley appeared with other witnesses for the opposition. The preamble of the Bill was declared proved; but clauses were inserted binding the promoters not to take more than the 2 million gallons a day when the daily flow is 5 million gallons, and not more than 3 million gallons at any time. The Ulverston District Council petitioned against the Bill; but before the Committee stage was reached an agreement was entered into, whereby the promoters undertook to supply the Council with water in bulk at 8d. per 1000 gallons.

The Water Needs of Harrogate, Leeds, and Ripon. It was only in 1898 that the Harrogate Corporation purchased the water-works; and even with the large extensions then in hand, and which will cost some £100,000 to £120,000, the Corporation find that, with a continuance of the present

growth of the population, a very few years will find them at the end of their resources, unless another big scheme is undertaken. They are therefore asking Parliament to allow them to appropriate water from the Burn watershed, which eminent engineers tell them is the best available source for the town. There are three Bills in Parliament this year dealing with the same watershed —Harrogate, Leeds, and Ripon; and they have been referred to a Committee of which Lord Hawkesbury is Chairman. The Harrogate Bill was taken in hand yesterday week. There were four opponents; but the chief of them—the Leeds Corporation—only sought for protective clauses. It soon transpired during the proceedings that there was an understanding between the Harrogate and Leeds Water Committees, to the effect that the former were willing to bind themselves not to take more than 2 million gallons a day from the Pot Beck—the proposed source, and a tributary of the Burn. The water is stated to be good; and the available quantity 3 million gallons a day, 2 millions of which it is intended to impound, and the odd million is to be sent down the stream as compensation water. A reservoir is to be formed by an embankment across the beck; and its capacity is estimated at 575 million gallons, which will allow of 3 million gallons for 180 days. In accordance with modern principles, too, the Bill proposes the acquisition of an area surrounding, so as to prevent contamination. The cost of the new works will be approximately £325,000; and their construction will occupy six or seven years. During the early proceedings, the promoters showed a disposition to give undertakings to minimize to the utmost extent any possible injury to private estates. Evidence in favour of the Bill was tendered by Alderman Fortune, Chairman of the Corporation Water Committee, Mr. James Mansergh, Mr. George F. Deacon, Mr. Charles Gott, and Mr. Charles Lapworth; while on the side of the opponents were Mr. Thomas Fenwick, Mr. E. K. Burstal, and Mr. E. M. Eaton, who tried to show that there was no justification for disturbing the estates of the Marquis of Ripon, Lord Masham, and Sir Christopher Furness, as was proposed. Although a strong appeal was made by Mr. Balfour Browne for an independent pronouncement on the measure, the Committee determined to reserve their decision until after they had heard the case for the Leeds Bill.

Their Lordships at once turned their attention to the Leeds Corporation Bill. To a large extent the representation was the same as in the Harrogate case—the opponents being chiefly the private owners and the Ripon Corporation. In regard to Ripon, they proposed (in their Bill) to go to the Laver for a supply; but this it was contended would do Leeds a great injury, because it would take water from their proposed drainage area. The promoters further asserted that the Ripon Council do not require further water; and if they really did, their wants could be met by Harrogate. But turning to the Leeds scheme, it contemplates the doubling of the supply, so that it is an undertaking of respectable pretensions. It is proposed to construct six reservoirs —three in the Burn Valley, two in the Laver Valley, and one in the Skell Valley. It is expected that a supply of 18,734,000 gallons a day will be available. The total reservoir capacity arranged for is 5200 million gallons; the drainage area is 23,307 acres; and the total estimated cost is 2¾ millions. The works will take ten years to construct; but it is hoped that they will solve the problem of the water supply of the city and district for years to come. Experience having shown the mistake the Corporation made at Washburn in not at the outset taking land to protect the water area there, they now seek powers to purchase the land surrounding the proposed new source of supply; and so the landed proprietors opposed. During the second day's proceedings (Thursday), it was stated that Ripon had withdrawn their opposition, terms having been arranged under which Harrogate has agreed to supply Ripon with 200,000 gallons of water a day at 4d. per 1000 gallons. In the event of failure on the part of Harrogate, Leeds will come under an obligation to supply. Under the circumstances, the water portion of the Ripon Bill will now be withdrawn. On Friday morning, the Committee consented to an adjournment until yesterday, in view of important proposals having been made to Lord Masham, which deserved his serious consideration.

Broadstairs Water Purchase. The Broadstairs Water and Improvement Bill was in the group of measures referred to Lord Jersey and his colleagues; and they considered it on Monday last week. The most important part of the Bill is that in which the District Council seeks for parliamentary sanction to the transfer to them of the water undertaking; and this section was unopposed. However, in order to formally prove the preamble in this respect, Mr. W. A. M'Intosh Valon, the adviser to the Council, was called. From the information he gave their Lordships, it appears that the terms of purchase have been fixed by agreement under his advice; and he is of opinion that the bargain arrived at is an absolutely fair one, and one that will be of great advantage to the district in future. He also stated that it is in the interests of the district that there should be an extension of the adits to enable the District Council to supply water without using the Crampton Tower or Richardson's pumping-station. It is the intention of the Local Authority to do away with these two subsidiary stations, so far as domestic purposes are concerned, and to use them for street watering and flushing or other purposes, unless in case of accident, which is not likely to occur. The water from the Crampton Tower and Richardson's pumping-station is somewhat impregnated with salt water; but the other water is absolutely pure. The Bill was ordered to be reported to the House for third reading.

Leeds Gas-Workers' Wages.—A Sub-Committee of the Leeds Corporation last Friday had under consideration a number of applications for increase of wages from men employed at the various gas-works. It was decided to advance the chargers of the inclined retorts at Meadow Lane 4d. per shift; the foreman at the workshops 4s. per week; the elevator-men at New Wortley 4d. per shift; the furnace-men at New Wortley 2d. per shift; and to pay the first and second class pipe-layers for "walking time" from the job to the radius. With respect to the stokers, who had applied through the Gas Workers' Union for an advance of 6d. per day, the Committee decided to defer further consideration of their application until information has been obtained from other towns.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Aldershot Gas and Water Bill, Burgess Hill Water Bill, Ilkeston and Heanor Water Board Bill, Kettering Urban District Water Bill, Llandrindod Wells Urban District Council Water Bill, Long Eaton Gas Bill, Richmond Gas Bill, Stroud Gas Bill, Tees Valley Water Board Bill, Tendring Hundred Water Bill, Wells Corporation Water Bill, West Surrey Water Bill.

Bills read a second time: Derwent Valley Water Board Bill, Water Orders Confirmation (No. 1) Bill.

Bill reported: Honley Urban District Council Gas Bill.

Bills reported, with amendments: Broadstairs and St. Peter's Water and Improvement Bill, Handsworth Urban District Council Bill, Leeds Corporation (General Powers) Bill.

Bills read the third time and passed: Faversham Water Bill, Gravesend Gas Bill, Honley Urban District Council Gas Bill, Poulton-le-Fylde Gas Bill, Southport Water (Transfer) Bill, Weston-super-Mare Gas Bill.

The opposition to the Heywood and Middleton Water Board Bill and the Ripon Corporation Bill has been withdrawn.

The Darlington Corporation and the Tees Conservancy Commissioners have petitioned against the Tees Valley Water Board Bill.

A Bill to provide for improving and extending the procedure for obtaining parliamentary powers by way of Provisional Orders in matters relating to Ireland, was brought in last Friday by the Earl of Mayo, and read the first time.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills brought from the Lords, read the first time, and referred to the Examiners: Faversham Water Bill, Prestatyn Water Bill.

Bills read a second time and committed: Bath Gaslight and Coke Bill, Chester Gas Bill, Local Government Provisional Order (Gas) Bill, Winsford Urban District (Gas Transfer, &c.) Bill.

Bill reported: Metropolitan Water Companies (Amendment of Acts) Bill.

Bills reported, with amendments: Aldeburgh Corporation (Water) Bill, Alfreton Gas Bill, Golborne Gas Bill, Mond Gas Bill, Omagh Gas Bill, South Metropolitan Gas Bill.

Bills read the third time and passed: Aldershot Gas and Water Bill, Burgess Hill Water Bill, Grangemouth Water Provisional Order Confirmation Bill, Ilkeston and Heanor Water Board Bill, Kettering Urban District Water Bill, Llandrindod Wells Urban District Council Water Bill, Mansfield Corporation Bill, Richmond Gas Bill, Stroud Gas Bill, Tendring Hundred Water Bill, West Surrey Water Bill.

HOUSE OF COMMONS COMMITTEE.

Thursday, May 2.

(*Before Mr.* SEALE-HAYNE, *Sir* HARRY BULLARD, *Mr.* G. WHITE, *and Mr.* C. ALLEN.)

BEXLEY TRAMWAYS BILL.

This was a Bill promoted by the Bexley Urban District Council for powers to construct electrical tramways. It was opposed by the South Metropolitan Gas Company and the Kent Water-Works Company, who wanted a provision inserted in the Bill making the Council responsible for any damage that might be done to their pipes and mains from electrolytic action, independent of any question of negligence in the management of the tramways.

The Hon. J. D. FITZGERALD, K.C., and Mr. VESEY KNOX represented the promoters. The petitioners against the Bill were represented as follows: The South Metropolitan Gas Company, by Mr. BALFOUR BROWNE, K.C., Mr. BAGGALLAY, K.C., and Mr. NEVILLE; the Kent Water Company, by Mr. BAGGALLAY, K.C., and Mr. MOON.

Mr. FITZGERALD, in opening for the Bill, said the Bexley Urban District Council were seeking powers to construct about five miles of tramways, to be operated by electricity on the overhead trolley system. The district to be served was adjacent to London; and its population was a rapidly increasing one, consisting largely of working class people. If the scheme of the Bill were carried out, there would be an electric system of tramways from the further side of Bexley to Woolwich, and on by the existing Greenwich and Woolwich line to Greenwich. The only opposition to the Bill came from the South Metropolitan Gas Company and the Kent Water-Works Company, who wanted a provision inserted making the Council responsible for any damage done to their gas and water pipes from electrolytic action, independent of any question of negligence in the management of the tramways. This subject had a parliamentary history, to which he should briefly call the attention of the Committee. In consequence of the matter being brought forward constantly by the United Telephone Company, who succeeded in getting clauses protecting their wires introduced by consent into various Bills, a Joint Committee was appointed by Parliament, in 1893, to inquire into, and report upon, the matter. The result of the Committee's report was that a model clause was drawn up by the Board of Trade; and this clause was included in the present Bill. The gas and water companies were not satisfied with it, and were continually asking for further protection. Many promoters, to save opposition, had consented to insert a clause satisfying the gas and water companies; but whenever the matter had been brought before a Committee of the House of Commons, they had held to the Board of Trade clause. It was only during the last few years that the gas and water companies had again taken the matter up. Mr. Livesey, the Chairman of the South Metropolitan Gas Company, had written letters to

the "JOURNAL" advocating a coalition of gas companies to get some clause of this sort put in Bills, in spite of the decision of the Joint Committee. The Board of Trade had been approached and asked to alter their clause, but had seen no reason for doing so. Although the insertion of the gas and water companies' clause had been twice procured in the House of Lords, it had been invariably refused in the Commons. The matter arose in the London County Council Tramways Bill of last session; and the Lambeth Water Company appeared in opposition to that Bill. In the Commons, the clause proposed by the Lambeth Company was refused; but in the House of Lords, after a discussion, the clause was inserted, and was now in the London County Council Act of last year. The question was also raised in the case of the South Eastern Metropolitan Tramways Bill. The model clause inserted in the present Bill imposed on the promoters the taking of reasonable precautions, failing which they became liable. They must act in accordance with the Board of Trade regulations to prevent fusion or injurious electrolytic action. But gas and water companies asked that they should be made liable, even though they complied with the Board of Trade regulations and used all reasonable precautions. This was the very point fought before the Joint Committee, who decided that there was no reason why the gas and water companies should be placed in that favoured position. He would ask the Committee whether it was reasonable that a number of powerful companies should endeavour to coerce Parliament by debating this matter time after time before Committees Ought they not rather to put evidence before the Board of Trade: hat the regulations were insufficient? But it appeared from the Kent Company's petition, that the water companies had approached the Board of Trade in December last, and the Board had not seen fit to alter the regulations. So, not being able to get a decision in their favour from the Department or the Joint Committee, they hoped to get it by opposing every Bill. They put local authorities to the expense of opposed Bills, hoping that by doing so they would consent to the introduction of a clause rather than incur the expense of a contest. He asked the Committee to adhere to the decision of the Joint Committee.

Mr. *R. A. Dawbarn*, of Messrs. Mudie and Dawbarn, Consulting Electrical Engineer, gave evidence as to the details of the scheme. The tramways, he said, would be operated on the trolley system, with a line return. Under the Board of Trade regulations, the amount of electricity which would escape would be a negligible quantity. It was unreasonable on the part of the Companies to ask for more than the Board of Trade regulations. He calculated that the electrolytic action in such a case as this would not waste the pipes for hundreds of years. He knew of no case of damage done by electrolytic action when the Board of Trade regulations had been adhered to. The leakage would not amount to more than 2 amperes.

In cross-examination, witness admitted that, under certain conditions of soil and so forth, electrolytic action might be set up. The extra cost of the conduit system in this case would be £40,000 or £50,000; and it would increase the cost of working the tramways.

By the CHAIRMAN: The waste of iron would be, for a leakage of two amperes, about 30 oz. a year. The 30 oz. would not be evenly distributed over the five miles of line; but he could not conceive any conditions under which it would be concentrated.

Mr. Robert Hammond, Mr. Edward Manville, and Mr. Stephen Selbon also gave evidence as to the sufficiency of the Board of Trade regulations to prevent electrolysis.

Friday, May 3.

Mr. *H. M. Sayers*, Engineer to the British Electric Traction Company, examined by Mr. VESEY KNOX, said the leading facts of electrolysis had been known for 45 or 50 years past; and the only new experience that had been gained of late years was in regard to electric tramways. There had been no case of damage from electrolytic action to pipes where the Board of Trade regulations had been carried out. If the pipes were negative to earth, corrosion would not take place. He would suggest that connecting the pipes to the rails would ensure the whole of the pipes being negative to earth. The only objection to this suggestion was that such a connection rather tempted stray currents to come back by the pipes; and if there were breaks in the metallic connection, the electricity might leave the pipes and cause corrosion. Either a pipe was a conductor or not. If a conductor, then, by connecting the pipe with the rail, electrolysis was prevented; and if not a conductor, there would be no electrolysis. Heavy rails were used with tramways, connected with copper bands, of great conductivity, so that in the rail an extremely good conductor was furnished. He should say it was impossible to tell whether corrosion in pipes was due to the natural action of the soil or to electrolysis. There was a natural corrosion which took place, due to the elements of the pipes themselves and the substance of the soil; and there was no means of distinguishing. If such a clause as the gas companies asked for were granted, tramway companies would be liable to actions involving large expenditure for expert evidence, even if they won. It would be a serious hindrance, and he should advise any people with whom he was connected to drop their schemes until the matter was put on a new basis.

In cross-examination, witness said he was aware that damage would have to be proved; but tramway companies would be exposed to needless litigation. His first opinion was that it was better not to connect the pipes with the rails; but this was a matter for the pipe-owners. It would increase the amount of current going back through the pipes. His chief objection was to the liability to litigation.

This closed the case for the promoters; and evidence was taken on behalf of the South Metropolitan Gas Company.

Mr. *George Livesey* said the cast-iron pipes laid by his Company were practically everlasting. The specimen of pipe before the Committee was taken up in the Clapham Road from a line of pipe about 100 yards long, and was damaged by electrolysis after it had been in the ground about eight years. He had no personal objection to electric traction, but only objected that there should be damage to their pipes. He put the matter in a public light. He was convinced that the only way to get complete protection was that traction companies should have insulated returns. He could not understand the action of the electric section of the Chamber of Commerce in taking up the cudgels against the gas section.

In cross-examination by Mr. VESEY KNOX, witness said that in some cases there might be a great deal of acid in the ground, and the pipes might become corroded quickly. All sorts of causes were responsible for the leakage of gas. The South Metropolitan Company did all they could to stop leakage, which in their case amounted to $2\frac{1}{2}$ per cent.

By the COMMITTEE: They would not press here for insulated returns, on account of the extra expense involved, and this being a suburban line; but that must not be taken as a precedent. He did not think the Board of Trade was the body that should decide this matter, but Parliament. In the case of tube railways, insulated returns would be a comparatively trifling expense compared with what it would be in this instance.

Professor *John Perry* said he had had a great deal of experience in regard to electric traction, and had both theoretical and practical knowledge of the subject. He had experimented and found that electrolysis occurred with almost any voltage, even with $\frac{1}{100}$ of a volt; it was only a question of degree. When electricity came into a metal, no harm was done; but when it went out of a metal, damage was caused. One ampere flowing for a week, if the soil were damp, would remove one cubic inch of iron. If the soil were dry, there would not be much damage. But if it contained soluble chlorides, the damage would be four or five times greater; and there would be secondary chemical action. Where there was rapid electrolytic action at one point, there would be protection of the rest of the pipe. The Board of Trade regulations did not give sufficient protection to the owners of pipes. He was not aware that there was actual evidence of this, but electrolysis was continually going on. Questioned as to whether it was easy to tell if damage to pipes was electrolytic or not, witness said ordinary corrosion would extend for a considerable distance wherever the soil was bad. There was danger under the Board of Trade regulations, which might become extremely serious in twenty years. The risk was greater at the joints of pipes.

Professor *Dewar*, in giving evidence, said that the electrolysis of iron could be produced with a much less voltage than the 1·5-volt limit fixed by the Board of Trade. The regulations seemed to have been based on the impression that no damage would occur with a less voltage. The effect of a leakage of electricity on pipes would be to hasten the oxidization always going on.

In cross-examination, witness said it might be in some cases difficult to distinguish electrolysis from corrosion; but not if a pipe were pitted locally

Professor *Ayrton* said he thought that, when the Board of Trade framed their regulations, they were unaware of the fallacy of supposing that 1·5 volts was a safe limit, below which electrolysis would not occur. Witness produced a plate for the Committee to see which had become perforated after being exposed for a week to a much less electrical pressure. The Joint Committee had recommended that the return conductor should be of such resistance as to have no difference of potential sufficient to set up injurious currents in the earth. This was an admirable regulation; but it did not seem to him that the Board of Trade, in consequence of the fallacious idea to which he had referred, had carried out the recommendation.

Tuesday, May 7.

Professor *Ayrton*, recalled and re-examined by Mr. MOON for the Kent Water Company, said that Mr. Dawbarn, in speaking as to the amount of iron which would be eaten away in a year for a leakage of one per cent., had made a mistake. He was confusing ounces with pounds. It should be about 15 lbs. per year for 1 per cent. of current. The weight of a cubic inch of iron was a little over a quarter-of-a-pound; and one ampere of electricity leaving an iron pipe took with it about a cubic inch of iron in a year. To make the matter absolutely definite, he might mention that, since the last sitting of the Committee, he had carried out certain experiments with the apparatus on the table. He had put two iron plates in a solution of salt, equivalent to 1 pint of salt to 200 pints of water. Two sets of things had been employed. In one case, two small iron plates were put far apart in this weak salt solution; and in the other case, two large lead plates put near together in a strong solution of sulphuric acid. The small iron plates far apart tended to diminish the current; the two lead plates near together tended to increase the current. The electricity maintained from Friday till that morning had always been under the $1\frac{1}{2}$ volts prescribed by the Board of Trade. The result was that, in the case of the lead plates, practically no current could pass at any time; and therefore no decomposition of the lead had taken place. But in the case of the iron plates, the current had passed steadily day and night; and in measuring the amount of iron removed, he had found it was a trifle more than the quantity to which he had been referring just now. That was rather more than would give 14 lbs. of iron from 1 ampere flowing for a year. This experiment reduced it to an absolute fact that, if a current of 1 ampere flowed out of an iron pipe, and the soil in the neighbourhood contained a trace of chlorine, there would be removed from the iron pipe about 14 lbs. of iron in a year. The Board of Trade regulations did not specify the current, but said there must not be more than $1\frac{1}{2}$ volts pressure between the pipes and the rails. There was this difference between gas and water pipes, that in the case of water-pipes, they were very much better conductors of electricity than gas-pipes; and therefore there was a greater chance of the current entering the pipe, and going along it and leaving it. It had been pointed out that where there was an electrically bad joint the current would leave the pipe, and return to it on the other side of the joint. This tendency would be more marked in the case of a water-pipe. But instead of passing into the soil, it would pass into the water, and back again into the pipe; so that there was a greater probability of damage being caused inside water-pipes than with gas-pipes. It would be necessary to uncover miles of pipe to make a proper survey.

By the COMMITTEE: The substance of his evidence was that there was no point below which electrolysis could not take place.

Mr. *W. Morris*, Chief Engineer to the Kent Water Company, gave evidence as to the pipes and mains of his Company. He said the proposed tram-lines were along roads in which their mains were laid.

This closed the evidence against the Bill.

Mr. *A. P. Trotter*, the Electrical Advisor to the Board of Trade, examined by the COMMITTEE, said he had practical knowledge of electric traction, and had made a special study of stray or leakage currents. He inspected the electrical equipment of railways and tramways in the United Kingdom, examining some five or six a month. In inspecting tramways, he did so with a view to the safety of the public. There was no special inspection as to the regulations; but he satisfied himself generally on the subject. The negative information gained since the Board of Trade regulations had been in force was important. There had been no cases of electrolysis under the regulations. From a practical point of view, there was a considerable area very closely defined in which it was possible for corrosion to take place, and outside which the pipes were absolutely protected. It was easy to make a test, and find out whether it was so. It was near the works, where some currents leaked back from the pipes to the rails, that danger was to be feared; and by the aid of a simple galvanometer and two steel rails, it was easy to go round and make a test. Any gas or water inspector could do it. There was a neutral zone in the case of a tramway, where there was no current passing either to or from the pipes; and this could be measured very closely. The corrosion which took place on account of the current leaving the pipes and coming back to the rails, could only take place in the danger area, and could be watched for. So far from saying that corrosion could not take place below 1·5 volts, he said that, if in the danger area there was 1 volt and at another place less pressure, the actual existence of the less pressure would be suspicious, and might be the result of the serious leakage between pipe and rail. As to water-pipes being better conductors, those who had measured them found that gas-pipes were much better conductors than water-pipes.

The CHAIRMAN: Would the clauses of the Bill embodying the Board of Trade regulations be sufficient to avoid electrical action where there was an uninsulated return?

Witness: So far as my own experience goes. I have watched the application of these regulations for sixteen years, and have not heard of a single case of any trace of corrosion having occurred in connection with tramways running under the regulations.

In further reply, witness said he believed the regulations were sufficient. Experience would show in a few years whether this was the case. At present there was no reason why they should be altered, although they might have to be in the future. If the theory as to the damage done held good, there would be no pipes left in the Clapham Road—they would have been corroded away long ago. The corrosion which took place was far less in practice than in theory; the laboratory conditions did not hold good.

Counsel having addressed the Committee,

Sir *Courtenay Boyle*, Permanent Secretary to the Board of Trade, examined by the CHAIRMAN, said he considered it impossible for the Board's Inspector to make anything like a general inspection of a tramway line. It was desirable that Parliament should make up its mind upon this class of question, and lay down a rule which all parties could follow. It was with this desire for uniformity that the Joint Committee was appointed. He could not look into the future; but the Board had hitherto believed their regulations were sufficient. They had been made after hearing the evidence and suggestions of the most capable men in the United Kingdom; and the Board hoped they were a sufficient protection of the interests involved. The Board had had no proof of electrolysis going on brought before them. It might be going on, and might be felt in the future. The evidence of the eminent gentlemen given before the Committee deserved the careful attention of Parliament. There had been a deputation of the gas and water companies to the Board; but no action had been taken, as the Board were waiting for proof. Since the gas and water companies could not, like telephone companies, protect themselves, and were simply innocent users of the earth, they had a great claim for consideration by Parliament. If cause were shown, the Board could alter the regulations.

The Committee deliberated in private; and on the re-admission of the public,

The CHAIRMAN said: The Committee have decided that the preamble of the Bill is proved.

In reply to Counsel for the Kent Water Company, the CHAIRMAN said the question could be reopened on the consideration of clauses; but after the decision of the Committee, Counsel would, of course, see that the matter was a somewhat hopeless one.

Later in the day, at the commencement of proceedings upon the London County Council (Tramways and Street Improvements) Bill, before the same Committee,

Mr. BALFOUR BROWNE intimated that, although it had been intended to raise the same point on that Bill, after the decision of the Committee on the Bexley Bill the Gas Company would reserve their opposition for another place.

The question of electrolysis also came before a Select Committee of the House of Lords, presided over by the Earl of Ducie, on Thursday and Friday week, in connection with the Bill promoted by the South Lancashire Tramways Company to obtain £150,000 additional capital, and power to construct other tramways in connection with their system authorized last year. Two of the petitioners against the Bill—the Bury and District Water Board and the Corporation of Salford—raised the question of damage to their pipes and mains from electrolytic action, and asked for the insertion of a clause to the effect that nothing in the Bill should relieve the Company from liability to make compensation for any such injury or damage. After hearing the evidence of Mr. E. Manville, who testified to the sufficiency of the Board of Trade regulations to prevent damage to pipes, the Committee decided not to insert the clause.

Bristol has now 7963 gas-lamps in the city. The consumption of gas for the past quarter was 43⅛ million cubic feet, and the lighting bill, including £1 each for 51 oil-lamps, was £6578. The ratepayers are charged 2s. 1d. per 1000 cubic feet for the gas.

HOUSE OF COMMONS COMMITTEE.

Monday, May 13.

(*Before Sir* HENRY FLETCHER, *Chairman, Mr.* STRACHEY, *Mr.* MORRIS, *and Mr.* TOMPKINSON.)

SOUTH METROPOLITAN GAS BILL.

The proceedings in this Bill (*ante*, p. 1316) were resumed to-day.

Mr. *George Livesey*, recalled by Lord R. CECIL.

Witness explained the following alternative proposals to be attached to the Bill:

New Clause 3A. From and after the completion of the said purchase the price charged by the Gaslight and Coke Company for 16-candle gas supplied by them to the public lamps within their limits of supply shall not (except as hereinafter provided) exceed the price of 2s. 8d. per 1000 cubic feet. Provided that if at any time the lowest price charged by the Company for gas supplied to private consumers shall exceed 2s. 8d. per 1000 cubic feet, the Gaslight and Coke Company may, during the continuance of such price, charge for the supply to public lamps a price per 1000 cubic feet equal to, but not greater than, such lowest price.

Proviso to Clause 3. Provided that no such agreement shall have effect until the standard price of the Gaslight and Coke Company shall have been fixed by Parliament at 3s. 3d. per 1000 cubic feet for a standard dividend of 4 per cent. with a scale of increase or decrease of dividend of 2s. per cent. for every 1d. of decrease or increase of price below or above 3s. 3d., and a secondary or additional scale of increase or decrease of dividend of 2s. per cent. for every complete 3d. of decrease or increase below or above such standard price, or until such other alteration or variation of the standard price and dividend of the Gaslight and Coke Company shall have been fixed as Parliament may think fit.

Lord R. CECIL said that the new clause had not been examined by the Committee, because Mr. Littler and the other Counsel on the other side had not seen it.

The CHAIRMAN: This proviso is in dispute, is it not?

Lord R. CECIL: That is so.

Mr. LITTLER (for the Corporation of London) objected to legislation in the absence of the Gaslight Company, on whom they could impose no terms. This was a sale of part of the undertaking of the Gaslight Company, and an attempt to impose conditions in respect of the portion which they would continue to hold. That was, in a summarized form, his objection. Whether the proposals were in order or out of order, they were impossible.

Mr. POPE (for the Chartered Company) said it was for the Committee to say what the conditions should be.

Mr. LITTLER said it was useless to go on discussing with one of two bodies a matter in which both were interested, without one of them being present. That body might in the end say "we will not agree to the settlement you have arrived at." The agreement was scheduled to the Bill; and a common form of dealing with a matter of this kind was to insert a clause saying that the agreement should be subject to modifications. His learned friend would listen to what was going on; and when they had arrived at a decision, he would say whether or not he chose to come to an agreement.

Mr. POPE said that neither of the Companies had power at present to carry out the recommendation of Sir J. Rankin's Committee. The object of the proposals was to empower both Companies to do what Sir J. Rankin's Committee said should be done; but without parliamentary authority, they had no power to agree. It was for Parliament to say, "You shall only agree on certain conditions."

Mr. LITTLER said that, whatever was done, he desired the Gaslight and Coke Company to be present, when they were all in a position to discuss what Sir J. Rankin's Committee required. How could they go on when, after a two or three days' sitting, the Gaslight and Coke Company might say, "We are not going to agree to these terms." The whole matter should come before Parliament; and an agreement should be arrived at between the parties, before Parliament could say whether or not they would impose conditions. Suppose the Committee put in clauses, and the Counsel for the Gaslight and Coke Company might say, "These are very onerous," and might go out of the room. The Company might refuse to assent to any arrangement the Committee made. It would be altogether a new parliamentary proceeding to discuss the terms of an agreement between two Companies of this kind as though the Committee were a Court of Arbitration. The proper procedure would be for the parties to come with a scheme agreed upon by both sides, and ask the Committee if they would accept it. What the Gaslight and Coke Company would get under the proposal before the Committee would be parliamentary powers without going to Parliament.

Mr. POPE said he thought his learned friend was a little unreasonable.

The room was then cleared; and on the re-admission of the public,

The CHAIRMAN said: The Committee have carefully considered the arguments both for and against what has been put before us, and we have come to the conclusion that the new clause 3A, and the proviso to clause 3, cannot be dealt with, as they do not come within the notices.

Lord R. CECIL said this decision put his clients in a certain difficulty, because the position of the Company was rather complicated by the rejection of the Gaslight and Coke Company's Bill on second reading. The two Companies had come with Bills before the House, and were prepared to have fought the question out, and to have obtained the decision of the Committee.

Mr. *Livesey:* And last year, too.

Lord R. CECIL said they were anxious to obtain power to get the statutory difficulty in the way of their purchasing this district removed, without in any way prejudicing any question which might arise as to the Gaslight and Coke Company's position. Therefore, he would suggest that some such proviso as the following should be put in to meet the difficulty: "Provided that no such agreement shall have effect until the Gaslight and Coke Company shall have had power from Parliament to raise additional capital." This would enable the whole matter to be discussed when the Gaslight and Coke Company came to raise additional capital, which was the time at which Sir James Rankin's

Committee thought it right the question of restriction on capital should be brought before the Committee. The effect of clause 3 with this proviso would be to remove the statutory difficulty under which the South Metropolitan Company laboured, which prevented them from buying the district. It would not alter the position of the Gaslight and Coke Company. They would be left in the same position as at present; but the South Metropolitan Company would not have to promote another Bill for the mere purpose of buying this particular district. He did not think the proviso would be open to objection, either in point of order or on any other point. It would not affect any one's interests. The question of lamps, sliding-scale, initial price, and so forth, would be left free and unfettered. The only thing it would do would be to enable the South Metropolitan Company to buy this district when, and as soon as, all these difficult questions affecting the Gaslight and Coke Company had been settled. It would not prejudice the discussion of this question.

Mr. RIGG said his learned friend declared: "Give us these powers; but we will not buy until the Gaslight and Coke Company come for fresh capital powers." But what was the use of this power if it could not be exercised until the Gaslight and Coke Company came to Parliament for further powers? Not only would the Company be unable to exercise the powers until they came to Parliament again, but Parliament would then be able to put upon the Company any conditions it chose as to new capital. It was utterly unnecessary for the South Metropolitan Company to have these powers, because if they could, as they suggested by the former clause, give the Gaslight and Coke Company power to sell to them by this Bill, it was obvious, to use their own argument, that, when the Gaslight and Coke Company came with their Bill, they would already have the facilities they sought. It was unnecessary to prejudge the matter at all, or to do anything. They should wait until the Gaslight and Coke Company came there, when the whole thing could be discussed—the question of price and everything else. Having decided that the provisions which were just submitted could not go on, he ventured to think they should let the Bill drop.

Mr. FORBES LANKESTER (for the East Ham Urban District Council) contended that the present proposal of the promoters was opposed to the decision of the Committee.

Lord R. CECIL said the promoters proposed to limit the restrictions preventing the South Metropolitan Gas Company from buying.

Mr. FORBES LANKESTER said if that was so, and no powers were given to the Gaslight and Coke Company, then they did not want this clause at all. The clause would give the Gaslight and Coke Company power to enter into an agreement which they had not at this moment, and they would get that in a Bill to which they (the Gaslight and Coke Company) were not parties. When the further powers were sought by the Company, it would not be necessary that the agreement should come on for discussion at all; neither that, nor the question of public lamps and so forth, would be before Parliament. The object of the Committee's decision, therefore, would be evaded.

Lord R. CECIL said the point of the opponents was twofold. They said the clause was no use, and that it gave the Gaslight and Coke Company some power which they would not otherwise have, and, therefore, was not consistent with the decision the Committee had just given. He recalled to the mind of the Committee what the position of affairs was before the Bill was introduced, pointing out that the South Metropolitan Company had endeavoured to carry out every part of the recommendations of the report of Sir J. Rankin's Committee but this. They came to Parliament for power to bring about the transfer last session; and this year they renewed the application. Under these circumstances, he submitted that the proviso carried out—so far as they could carry it out in the Bill—the recommendations of Sir J. Rankin's Committee; and by the proviso they freed themselves from any danger of infringing on the decision given by the Committee as to the terms and conditions to be put on the Gaslight Company.

The CHAIRMAN: Do you not think that clause 3 sufficiently guards what you want without this proviso?

Lord R. CECIL said that, so far as the promoters were concerned, they did not care for the proviso at all. If the Committee cared to give them the clause without it, they would be quite satisfied.

Mr. RIGG: Without the clause, we should be left absolutely at their mercy.

The CHAIRMAN: So far as my knowledge of parliamentary procedure goes, the Gaslight and Coke Company have no Bill before the House. They had one, but it was withdrawn.

Lord R. CECIL: That is so.

The CHAIRMAN: They have no opportunity of bringing in the Bill in the present Parliament.

Lord R. CECIL: That is certainly the case.

The CHAIRMAN: The Committee have decided not to admit this proviso.

Mr. RIGG: To omit the clause altogether.

The CHAIRMAN: Oh, no.

Mr. LITTLER: But it follows, as a logical consequence, that clauses 2 and 3 go absolutely. Otherwise you give leave for purchase on imperfect information—before you have the Gaslight Company before you. That would be against the report of Sir J. Rankin's Committee.

The CHAIRMAN invited Counsel to proceed with their argument.

Lord R. CECIL said the promoters had tried to meet the petitioners; but they had rejected the offers made to them. They would now go on with the Bill as it stood.

Mr. LITTLER said that if clauses 2 and 3 were to stand, the petitioners would rather have the proviso than not.

Lord R. CECIL said his learned friend's colleague had argued against the admission of the proviso.

Mr. LITTLER: Because he said that clauses 2 and 3 ought not to stand. If you say they are to stand, we would rather have the proviso.

Lord R. CECIL: How difficult it is to please everybody.

Mr. RIGG: Not at all—if you strike out clauses 2 and 3.

It was pointed out that the provisos were rejected because they did not come within the notices.

The CHAIRMAN: The subject is decided.

Mr. *George Livesey*, recalled.

Witness said that clause 2 would enable the South Metropolitan Company to comply with the recommendations of Sir J. Rankin's Committee. It was introduced into their Bill of last year, which was passed by Mr. Oldroyd's Committee, but rejected by the House of Lords. Clause 3 was as follows: "The Company and the Gaslight and Coke Company may enter into and fulfil agreements for, and in relation to, such purchase and sale; and the transfer and vesting of the transferred undertaking in the Company, and all money received by the Gaslight and Coke Company for the sale of the transferred undertaking, shall be applied for any purpose for which the Gaslight and Coke Company are authorized to apply capital." That would enable the sale to be carried out, and would enable the Gaslight and Coke Company to apply the proceeds to the ordinary purposes of capital. They could not carry out the transfer without statutory power—they had not the money. They had come to Parliament for this power because the Gaslight and Coke Company also had a Bill before the House, and they wished to get the matter settled. If they did not obtain this permissive power, they would have to apply to Parliament again.

Lord R. CECIL: And an application to Parliament cannot be made for nothing.

Witness: No; these applications are very troublesome and expensive.

And expense of this kind that you are put to falls on the consumer of gas?—Yes; seven-eighths of it. If this power is not obtained, Parliament will be deferring that which will be to the advantage of the whole of London. If we get this southern district, we shall be able to make gas there at South Metropolitan price. The result of the Gaslight and Coke Company having to sell in the district at a lower price than they can sell for in the northern district, puts 1d. per 1000 cubic feet on the charge to the northern consumer.

This power will enable the Gaslight and Coke Company to carry out the recommendations of Sir J. Rankin's Committee?—Yes. It was stated by the Hon. Member who moved the rejection of the Bill, that the Company would get £900,000 by the Bill which had passed a second reading the week before. The passing of our Bill was put forward as a reason for rejecting theirs.

The other great objection raised to the clause is that it will affect the price of public lighting on the north of the Thames. Do you think, on general principles, that it is right and fair that a public authority should pay a much lower price for gas than a private consumer?—It is most unfair. In the early days of gas companies, it was a common thing to allow local authorities to have their gas at a lower price than that charged to ordinary consumers. That was in order to easily obtain power to lay the mains and pipes. But Parliament afterwards put the matter in a proper position, by saying that the price paid by public authorities should be the lowest price paid by any consumer. But it is an unfair thing to allow an absolutely differential charge as between public and private consumers, because the amount of loss in the case of the public authority must be borne by the private consumer.

Mr. MORRIS: Is there any variation in the charges of the Gaslight and Coke Company except in these two prices of their area south of the Thames?

Witness: No; the extreme price is charged in all the other parts of the district.

Cross-examined by Mr. RIGG.

Witness said that the question of public lighting did not affect his Company. They allowed the public authorities a discount of 5 per cent.; but there was no statutory provision bearing on the Company. The question of allowing to local authorities the lowest price charged to any consumer was before the Board of Trade in 1883, and had been confirmed by an Order in Council. It would be a just thing that the charge for public lighting by the Gaslight and Coke Company should be changed. The public authorities were getting an undue advantage to the extent of £37,000 a year. If the southern district were handed over to the South Metropolitan Company, the Gaslight and Coke Company would then have no private consumer taking gas at a less price than that prevailing over the northern area.

Mr. RIGG: They would be able to charge the public authorities 8d. or 9d. more?

Witness: Yes; but they would not do it.

How much does it amount to?—£37,000 a year.

That capitalized amounts to about £1,000,000?—That is not the way to put it. That £37,000, with the £35,000 they now lose in the south, would enable them to reduce their price 1d. per 1000 cubic feet over the whole of their district. No one but a madman would dream of raising the price by 8d.

Why are you so benevolent to the Gaslight and Coke Company?—I have attacked the Company more than any other man in existence. We are proposing to relieve them of a very onerous obligation.

If clauses 3 and 4 stand as they are, you will be able to purchase this area south of the Thames?—Yes. We arrived at an agreement last year for £900,000; but it will be more now.

Do you not think, from a public point of view, that anything which would keep the Gaslight and Coke Company from being obliged to come before Parliament would be a misfortune?—Well; I do not know. I think they are beginning to realize their position, and they will now do anything that it is possible for man to do to improve it. Last year the South Metropolitan Company urged before the House of Lords that, if this sale took place, the Gaslight and Coke Company would have a large sum to enable them to set at defiance Sir J. Rankin's Committee, if they thought proper to do so. The present Bill will allow them to do the same thing.

By Mr. FORBES LANKESTER: This year he had proposed that the sale should be accompanied with the conditions which had been discussed.

By Mr. MUNROE (for the City of Westminster): If the agreement went through, the charge for gas north of the Thames would be 3s. 4d. per 1000 cubic feet all round; the charges now being 2s. 8d. to public authorities and 3s. 5d. to private consumers. The transfer would mean a considerable loss to the public authorities; but it would be a gain to the private consumer.

Mr. MUNROE: The City of Westminster pay £21,344 at the present price. If you increase the price to 3s. 5d., the amount will be over £32,000, or an increase of about £10,000?

Witness: Yes.

The learned Counsel was proceeding to put questions to witness relative to the Gaslight and Coke Company's method of managing their business.

The CHAIRMAN: I do not think you can put questions to the witness to show bad management on the part of the Gaslight Company.

Mr. BEVEN (for the borough of Hackney) asked witness if there was any reason known to him why the price of gas should be greater north of the Thames than south of the river.

Witness replied that it was not his business to attack the Gaslight and Coke Company. But one reason for the difference between the north and the south was that the increase of business had been greater on the south than on the north. By that the South Metropolitan had been enabled to reduce their price of gas.

Has this been due to good business management?—It has been due partly to the population having increased.

You contemplate reducing the price of your gas still further?—At our general meeting we said we should make a reduction of 2d. per 1000 cubic feet from June.

Then the effect of the transfer would be to save the Gaslight and Coke Company a considerable sum (£8000 or £9000 a year) in respect of the reduction in the southern area?—It would save them from reducing the price of their public lighting.

In further reply, witness said they hoped to go down to a lower sum than 2s. 6d.; and no doubt the Gaslight and Coke Company would also reduce their price. He did not think that if the Gaslight and Coke Company obtained the advantages now offered, they would put the increased amount of money they received owing to the transfer to their reserve fund.

By Mr. MAYER (for the borough of Fulham): By the transfer the Gaslight and Coke Company would get £900,000 from the South Metropolitan Company; and part of that would have to be spent on increasing their works. They would also get £72,000 if they raised the charge for public lighting.

Mr. MAYER: Do you think it right that they should have all this money without being under terms?

Lord R. CECIL: They have refused terms; that is our difficulty.

By Mr. ALLAN (for the Borough of Shoreditch): He believed that the transfer of the southern portion of the undertaking of the Gaslight and Coke Company would be advantageous all round.

Mr. ALLAN: Do you think that because it will remove a statutory restriction or limitation from the Gaslight and Coke Company, they will be willing to sell at a very much less price than would otherwise be the case?

Witness: No; they are very hard to make a bargain with, I can tell you. Getting rid of the restriction will not benefit them. It will benefit the private consumer.

Mr. MORTEN (for the West Ham Corporation): I understood you to say that it was you who advised the proviso to clause 3?

Witness: Yes. I said that as these public authorities had got their public lighting for so many years—it is not a just arrangement—I thought the matter was one for a compromise. Our Agent said there would be strong opposition to this matter, and asked: "Have you any proposal to make?" I then suggested the compromise.

It was to meet the opposition which you feared that you suggested the price should not exceed 2s. 8d.?—Yes.

Lord R. CECIL (in re-examination): You put in this proviso as an offer of peace.

Witness: I did.

But the proviso having been rejected, you are prepared to stand by your Bill as originally deposited?—Yes.

It has been suggested that the effect of the transfer will be to make a present of varying sums of money to the Gaslight and Coke Company. That is not an accurate way of putting it?—No. They will save a loss on the southern district; and the result of that saving will be that their consumers will benefit.

Before they are able to pay an additional dividend to their shareholders, or transfer anything to their reserve fund, they must reduce the price of gas?—Yes; that is a condition precedent. It would also have the effect of enabling them to build new works in their northern district. The works at Nine Elms were built, I think, in 1860; and works built on a more modern system would enable them to manufacture gas cheaper than at present.

That must operate for the benefit of the consumers?—Yes. The plant which they would get would enable them to improve their working.

It was as part of a general settlement of the gas question in the Metropolis that Sir J. Rankin's Committee recommended that this area south of the Thames should be transferred to the South Metropolitan Company?—I understood so; and the Bill carries out that transfer.

When that is done, you will have completely carried out the recommendations of Sir J. Rankin's Committee?—That is so.

Lord R. CECIL said that was the case for the Bill.

Mr. LITTLER said the question was absolutely one for argument. Mr. Livesey had given all the facts he wanted; and he did not propose to call any witnesses.

Mr. FREEMAN then addressed the Committee on behalf of the London County Council. He said the matter which the Committee had to determine was in itself a very serious one; but by a series of accidents, it had got into a very serious position. The reason given by the South Metropolitan Company for being present in Parliament with this Bill was that the Gaslight and Coke Company were already in Parliament with theirs; and they appeared to be also under the belief that the latter Company had a perfect right to sell. The clause 3 would enable an agreement to be entered into for the purchase of the southern portion of the Gaslight and Coke Company's undertaking; and it stated that all moneys thereby received by the latter Company might be applied to any purposes for which the Company were authorized to apply capital. Now he submitted that the Gaslight and Coke Company had no power at all at the present time to sell their undertaking.

Mr. ROSTRON: Yes; they have. They have taken the advice of Counsel; and it is to the effect that they have such power.

Mr. FREEMAN said if they had obtained legal advice on the point, he was sorry to say the Company had wasted their money. Section 6 of the Act of 1860, under which they believed they had this power, simply said that the two Companies might apply to the Secretary of State, and if he was satisfied that it was in the public interest that an alteration should take place, he might sanction the alteration after hearing the parties. That was a different thing from saying that one company for its own convenience might sell its undertaking to another company. There was no such power of any sort or kind. In the public interest, he strongly urged that this portion of the Bill should not be passed, on the ground that the Gaslight and Coke Company had no power to effect it, and that if it were carried through it would enable that Company to achieve what they so much desired—namely, to keep away from the control of Parliament. The London County Council represented there all those enormous areas where the effect of this Bill, so far as it affected public lighting, would be much felt; and he confidently asked the Committee not to allow the Gaslight and Coke Company, by a Bill which was not even brought in by themselves, to obtain this additional capital in a round-about way, and to benefit by having for once been associated with a more respectable Company.

Mr. LITTLER, on behalf of the City Corporation, said the objection to the proposed proviso to clause 3 was that it did not cure the evil with which they had to deal, not that it did not mitigate it. He considered the Bill contained one of the most remarkable proposals which had been made to Parliament within his experience. Not only was it not said in this agreement, as was usually the case, that it should be subject to such alterations as Parliament might impose, but they had not come to an agreement at all. In this very serious matter, involving £1,000,000, they were asked to take a leap in the dark. If they had made an application to the Secretary of State in connection with a proposed agreement, they would have to satisfy him that one of the Companies was not in a position adequately to supply gas. But nobody doubted that the Gaslight and Coke Company were in a position to do that. The South Metropolitan Company stated that they had complied with every one of the reforms suggested by Sir J. Rankin's Committee, with the exception of this transfer of the district south of the Thames. But the Gaslight and Coke Company had not complied with one of the conditions; and it was for this reason that their Bill had been thrown out this year. This was a case in which the Committee ought not to take a single step when they had not the whole facts before them. The matter was complicated by the fact that the obligations which those he represented sought to impose were relating to the part of the Gaslight and Coke Company's undertaking which was not sold. The Company wanted to avoid any new obligation in accordance with Sir J. Rankin's Committee's finding. Every Bill promoted by them since that Committee sat had been rejected; and surely it was unreasonable that this Bill should be allowed to proceed on this occasion, and under such conditions. They had no control over the Gaslight and Coke Company; and if they put in anything unpleasing to the Company, they would not agree to it, although he believed they would swallow a certain amount rather than go to Parliament. Under the measure, they would get as much capital as Parliament had refused them this session, which they could apply to any of the purposes for which they were authorized to spend capital. There was no hurry in this matter. With regard to clause 3, it would sweep away and repeal legislation which had been obtained after the struggles of years on behalf of the whole of the consumers. It was said that the gas consumer and the ratepayer were two different persons; but that was an idle contention, as they were all, so far as public lighting was concerned, gas consumers. It was a serious thing that the lighting authorities should be deprived of an advantage advisedly granted by Parliament, and of which they had been in enjoyment for a great number of years.

Mr. FORBES LANKESTER, for East Ham, said he was absolutely dismayed at the interpretation which had been put on the position of the Committee with respect to the proviso to clause 3. The clause, as it now stood, without any proviso, was so monstrous and obviously unfair that Mr. Livesey himself did not think it would be possible to put it before Parliament without some accompanying proviso. He had assumed that if the Committee were against the proviso they would be against the whole clause, even as tempered by the proviso, and not against the latter, as, in its amended shape, the clause would give them some protection. They were now asked by the Bill, without the Gaslight and Coke Company or any parties to the measure being present, to alter the whole of the arrangements between that Company and the public lighting authorities north of the Thames. The South Metropolitan Company did not care what the public lighting authorities would have to pay; and he thought it was perfectly clear that this clause was one which had been concocted in conspiracy with the Gaslight and Coke Company.

Lord R. CECIL: There is no truth in that statement.

Mr. FORBES LANKESTER said the effect of the Bill was that it empowered the Gaslight and Coke Company to raise £900,000 of capital without any limitation having been imposed upon them by Parliament. It also empowered them to raise the price of gas for public lighting, so as to enable them to take another £37,000 a year from consumers north of the Thames. It was a monstrous thing to force this matter upon them without the Gaslight Company being present to be examined.

Mr. MUNROE, for the City of Westminster, said that from 1883 to the present time there had been in public lighting a uniform charge for gas throughout the Metropolitan area; but though that was the case, the South Metropolitan Company only charged 2s. 8d. per 1000 cubic feet to private consumers, while the other Company, owing to bad management, charged 3s. 5d.

Mr. BEVEN, on behalf of the Corporation of Hackney, said this Bill was an attempt to give a bonus and premium for bad management to the Gaslight and Coke Company. He held that the Bill did not carry out the findings of Sir J. Rankin's Committee, as they made certain specific recommendations with reference to capital; and this Bill did not comply with those recommendations. They had no security that, when the Company had money put into their hands, they would not act as they had done during the past ten years.

Mr. ALLAN, on behalf of the Borough Council of Shoreditch, said the proposals of Sir J. Rankin's Committee were for the purpose of bringing the Gaslight and Coke Company into line with the other Gas

Companies. This Bill, however, made no attempt to reduce the general price of gas north of the Thames; and he submitted that, until that was done, the reduction to the local authorities for public lighting should be maintained.

The COMMITTEE then deliberated in private for nearly three-quarters of an hour. On the re-admission of the public,

The CHAIRMAN said: The Committee have decided that the preamble of the Bill is proved, subject to the terms of the following proviso:—

Provided that no such agreement shall have effect until the Gaslight and Coke Company shall have obtained from Parliament power to raise additional capital; provided that the Committee shall be satisfied that the £900,000 or upwards to be paid for the transfer to the Gaslight and Coke Company shall be dealt with as to its application in a Bill to be promoted by that Company in the ensuing session of Parliament; and that the additional sum received as income by that Company from the local authorities, owing to the higher rate charged to them for the supply of gas, shall be applied to the relief of private consumers. In clause 5, line 8, the £7 10s. will be made £5.

The latter part of the decision refers to the sale of unissued ordinary stock. The clause will now read:

The Company, before offering the same to the holders of any other stock of the Company, or for sale by public auction or tender, may . . . . offer to the gas consumers and persons in the employ of the Company the stock so to be issued at as near as may be, but not more than, 5 per cent. below the average market price of such stock in the month immediately preceding such offer, &c.

The consideration of clauses was postponed.

Tuesday, May 14.

The Committee sat to-day for the adjustment of clauses.

Mr. ROSTRON submitted a draft proviso to carry out the decision of the Committee on the previous day.

The CHAIRMAN said the proviso was a little different to that they had drafted; but this was probably owing to its having been put into parliamentary language.

Mr. ROSTRON said the Committee had decided that the agreement between the two Companies for the transfer should not come into effect unless the Gaslight and Coke Company should have obtained, "in the ensuing session of Parliament," powers to raise additional capital, &c. The words "in the ensuing session of Parliament" had been omitted.

The CHAIRMAN said the Committee would not insist on the words.

Mr. ROSTRON: But we would prefer to have them in. They were omitted through inadvertence.

The proviso as amended (added to clause 3) was as follows:—

Provided that no such agreement shall have effect unless the Gaslight and Coke Company shall have obtained, in the ensuing session of Parliament, from Parliament powers to raise additional capital; and provided further that the Act authorizing the raising of the additional capital shall define the manner in which the money to be paid by the Company to the Gaslight and Coke Company shall be applied, and shall provide that all moneys which the Gaslight and Coke Company shall receive from any Local Authority for public lighting in excess of that which the Gaslight and Coke Company would have been required to charge but for the transfer of the said undertaking shall be applied in a reduction of the price of gas supplied to the private consumer.

Mr. ROSTRON asked the Committee if they would allow Mr. Livesey to go into the box to explain why they wanted £7 10s. below the mean market price in the auction clauses, instead of £5 allowed by the Committee.

The CHAIRMAN: I do not think we can allow that. The Committee went fully into that matter; and they think it important that the Bill should remain as amended. We shall have to draft a special report to Parliament on this Bill, on account of its being a precedent.

Mr. TOMPKINSON: Is this request made with a view to getting the Committee to alter their decision?

Mr. ROSTRON: The object would be to show the Committee why they should allow a little larger margin than £5.

The CHAIRMAN: We cannot do that.

The clauses were then adjusted, and the Bill was ordered to be reported to the House for third reading.

HOUSE OF COMMONS COMMITTEE.

Tuesday, May 7.

(*Before Colonel* WELBY, *Chairman, Mr.* LLOYD MORGAN, *Mr.* PLUMMER, *and Mr.* SOARES.)

MOND GAS BILL.

On the completion of the case for Walsall, in opposition to the Bill, as reported last week,

Lord ROBERT CECIL addressed the Committee on behalf of the Corporation of Smethwick, in which he said it was proposed by the Bill to establish one of the generating stations. His case in outline was that this Mond gas scheme would be of considerable injury to Smethwick, without conferring any public advantage. Besides the breaking up of the roads, and the competition with the existing gas authority, there were, in regard to Smethwick, special circumstances. The promoters proposed to take a large portion of land at present laid out as allotments. He should call those who represented the manufacturing interests of Smethwick, and who would say they did not desire this gas. In regard to the uses of Mond gas—heating and power—Mr. Humphrey had admitted that it would not be useful for the heating of boilers; Professor Dewar had told them it was of very little use for the purpose of heating incandescent burners, because the temperature of the flame was a low one; and Sir Alfred Hickman had explained that he was not prepared to use it for making bricks. He (Sir Robert) therefore submitted that, so far as heating was concerned, the case for this gas was very weak indeed. As to power, he contended that the actual evidence of the demand for Mond gas had not been of a very strong character. The Birmingham meeting resolution did not deal with what was the most important aspect of the case—viz., the financial. Mr. Howl had said he was very anxious to have it for his semi-portable engines; but that was no justification for a Bill of this magnitude. The whole problem in these cases was whether the cost of production was so much cheapened by the operation being carried out on a large scale, that the cost of distributing the gas could be paid out of the saving. If that was not so in this case, the scheme of the Bill was radically unsound. Unquestionably the evidence as to cost had been of a very vague character; and in regard to distribution, it was agreed that, if the consumers were small, the cost would be more than that of coal gas. It was important, therefore, to know the class of consumers really contemplated by the promoters; and Mr. Balfour Browne would perhaps acquit him of disrespect if he (Counsel) thought that his account of it must be rejected in favour of that of his witnesses. The cost of distribution had been given at ¾d.; he thought the Committee would see that was not so. He submitted that, in arriving at the cost of production, interest on the capital expended in making the producers must be considered; one could not get rid of the cost of production until one did so. If he were right, that made about 0·5504d. for production, and the remainder for distribution; the net result being that, if one added this to the net cost of production—which was just over 1d. on their own figures—without making any allowance for rates and taxes, which, he submitted, must be made, it would, of course, make the cost of production more nearly equal to the cost of distribution. It would be something under 1d.; and the cost of distribution would be something over ¾d. per 1000 cubic feet. If he were right in his figures, it resulted that the cost of production was very little more than the cost of distribution, or, in other words, the promoters had to show that they could make this gas on a large scale very nearly twice as cheaply as it could be made by a manufacturer for himself. The cost of distribution, even on their own figures, amounted to very nearly half the cost of this gas as it would reach the consumer; it being quite clear that, if produced locally, the whole cost of distribution was saved. What was looked for was evidence that they could save the amount by making it on a large scale; and it was evident that it required a much stronger case to justify a great central station for this gas than it would where the cost of distribution was relatively low. That was the whole problem before the Committee. One of the great points made why a small consumer could not effectually work the Mond process, was that he would not be able to deal with the residuals. Therefore, if they added the cost of the residuals, the cost of the gas to each consumer, making locally, would be about 1½d.; so that it would still be cheaper for him to make it than to take it from the Company. Now, assuming they were going to supply large works, and assuming the industrial value of the Mond gas, why should a large manufacturer pay 2d. per 1000 cubic feet to the Company for it if he were able to make it for 1½d. on his own premises. No figure had been given to the Committee to show what was the cost of producing this gas on a small scale. He submitted, from the experience of other producer gases, that it cost double to make it on a small scale, or else, if his figures were right, there was no advantage to the small consumer. Mere general statements that Mond gas could be made effectually and cheaply on a large scale were very unsatisfactory when one knew that other forms of producer gas could be made relatively very cheaply on a small scale. That was the point he meant so far as finance was concerned. There was one very important matter to consider upon which the whole of his argument rested—that everybody should be able to use the Mond process—and that would not be so if the Bill passed. Exclusive rights had been struck out in the filled-in Bill; but the first clause of the agreement set forth in the second schedule said that, "as soon as the Company had been incorporated, and 22,500 shares had been subscribed, Ludwig Mond should grant to the Company, and the Company should accept, an exclusive license." By that, Dr. Mond was to be statutorily disabled from giving any other license to anybody else in the district. The only license excluded from this grant to the Company was the existing license to Messrs. Albright and Wilson. It was abundantly clear that the purpose of the agreement was to bind Dr. Mond not to grant any license or use his invention in this district except through the Company. He contended that the Bill would override the Patent Act, in regard to the power reserved to the public to compel patentees to grant licenses on reasonable terms. It had been held over and over again in the Courts that a particular Act dealing with a particular point would always override a General Act. If he were right, the result of this Act would be to put the whole of the district during the currency of the patent at the mercy of the promoters. So that, if it be true, as he argued, that it would be a right commercial policy for large manufacturers certainly, and probably for small manufacturers, too, to make Mond gas for themselves, they would be absolutely prohibited from doing so by the Bill. If that were so, he submitted it would be a great public evil; and the stronger the case for the usefulness of the Mond gas, the more deleterious would the Bill be. The Bill ought not to be passed, or the Company should be confined at any rate to such districts as did not take the view his clients did of the industrial requirements of their constituents.

Wednesday, May 8.

Mr. *Edward B. Ellington*, Chief Engineer to the London Hydraulic Power Company, examined by Lord ROBERT CECIL, said that the conclusion to which he had come in the course of his experience had been that power supply alone in manufacturing centres could not be commercially successful.

Lord R. CECIL: Have you considered the proposals of this Bill with reference to whether the rates are low enough to enable the Company to pay commercially?

Witness: My opinion is that the large consumers cannot be supplied from central stations at a low enough cost to compete with their own production; and the small consumers alone will not warrant the capital expenditure required to supply them. I agree that the large

consumer can supply himself more cheaply under the Bill, and that it is better not to supply the small consumer.

In reply to the CHAIRMAN, witness said he meant by "large consumer" the consumer who, with his own plant, could produce gas more cheaply than the general supply.

The CHAIRMAN: That is rather begging the question. Have you any definition in your own mind as to how you divide the manufacturers into these two classes?

Witness: I should take the small consumer to be a consumer of two or three horse power—all below those eliminated from this Bill.

Lord R. CECIL: That is, 5-horse power.

In further examination, witness went into calculations, as a result of which he showed that, with the price of coal at 6s. a ton, a steam-engine of from 100 to 200 horse power could be used more economically with steam than with Mond gas.

Lord R. CECIL: In order to make a fair comparison, certain allowances must be made?

Witness: Yes; that is the coal alone. Anyone who is creating steam power for himself has a boiler and steam-engine. In the case of Mond gas, he only requires his gas-engine. Therefore the boiler, and the attendant on the boiler, are in addition to the engines required by Mond gas. The cost of that must be added to the cost of the coal to get an accurate comparison. The same coal as was used for producing Mond gas could be used for firing boilers.

Taking the same coal for the purposes of producing steam, or for the production of producer gas, you can get more power out of the steam than you do out of the gas; or rather you get the same power at the cheaper rate?—No. The consumer, by putting up his own boiler and engin eand using that coal, can get his power cheaper than he can by taking Mond gas at 2d. per 1000 cubic feet and putting it through his own engine. The real point of comparison is what the consumer would have to pay for Mond gas, and what he would have to pay if he put up producer plant for himself, and used the gas he made. In that way, it appears to me to be very strong against the distributing scheme of this Bill.

Would there be any substantial difference in the cost of coal whether Mond gas is made by a manufacturer or the promoters?—No. The extraordinary thing about the proposal of the Bill is that the actual amount of coal used at the central station is more than the quantity which would be used by producers put up at separate works.

Will you explain why that is?—According to the figures put in, the slack estimated to be used is 225,000 tons. Now of that slack, I make out that the actual amount of coal which is gasified at the five stations is 170,000 tons. The difference between 170,000 tons and 225,000 tons was to be used in getting steam from the boilers. At Brunner, Mond, and Co.'s works, and at other works of similar size, the exhaust steam from the engines is used; and there is no reason why the large consumers making their own gas should not do the same thing.

At the central station you would first have to have coal for the purpose of gasifying, and also to produce steam?—That is so.

Whereas the large consumer, who would almost certainly be using steam power for some purpose or another, can use his waste steam for that purpose?—Yes; and not only the steam, but the waste gases. They are a most important element, because there will be no waste gases at the central station. In addition to the coal which has to be used for getting the steam at the producer station, a large amount of coal or gas has to be used to compress the gas and to send it into the mains. That has this very important effect—that if you take the output of gas per ton of coal at the central station, you get for sale not 140,000 cubic feet of gas, but 100,000 cubic feet only. This scheme differs from every other central station scheme ever put forward in that the cost of coal at the central station is actually more than it would be on the consumer's premises.

That is to say, you have to use more coal?—Yes.

Continuing, witness said on the item of repairs, wages, renewals, &c., the central station, as compared with a manufacturer, would be at an advantage.

Lord R. CECIL: Assuming "general expenses, including rates and taxes," covers rates and taxes on the mains as well as on the producers, that would not fall upon a large manufacturer of Mond gas?

Witness: No.

Therefore the gross cost, which works out at rather over 1d., would certainly be no larger (indeed, smaller) for a large manufacturer than it would be for the central station?—Yes; very much smaller indeed in the case of the large consumer.

It has been put that a manufacturer would not be able to sell the sulphate of ammonia. Do you see any reason why he should not?—The really large manufacturer could put up his sulphate of ammonia plant; and many are doing it. A comparatively small user of the Mond gas, assuming he produces it himself, could not afford to put up a sulphate of ammonia plant. But that consideration has been anticipated by the promoters apparently, because I find it has been suggested that the Mond gas plant could be put up at individual works down at any rate to 250-horse power. Mr. Humphrey, however, in his paper, said no attempt is made to recover the sulphate of ammonia in such works.

In further examination, witness said the item of renewals, repairs, meters, &c., would be saved by the manufacturer who made his own Mond gas. Of the capital charges estimated by the promoters, a very considerable proportion must fall on the mains, and would therefore be entirely avoided by the private manufacturer. He was quite certain that the general expenses, rates and taxes, and salaries of the whole undertaking were very seriously under-estimated. The rates and taxes alone would amount to £15,000. He thought it would be fair to call the cost of producing 1d. per 1000 cubic feet.

Lord R. CECIL: Taking the capital charge, and assuming that about half of it must be charged to production, would not that operate in favour of the consumer, because he would not have to pay interest on capital expended on mains?

Witness: Yes. The consumers—certainly the large ones—would get the gas at half the cost at which the Company would be able to supply them.

Now, is the load-factor a very important matter to consider when you are dealing with central stations?—It is a vital matter. The really critical figure that you require to deal properly with these problems, is the maximum hourly output from the central station; and there is a means in this case of getting at that, because we have been told that 84 million cubic feet are to give power on a 50 per cent. load-factor—that is, working twelve hours out of the 24—which gives at least 7 million cubic feet per hour. The load-factor of 50 per cent. is really unattainable to the best of my judgment. I think a load-factor in this case of more than 33 per cent. is quite out of the question. There is first of all a great economy on the large consumer putting down his own plant. Supposing the mains were laid past the consumer's works, he would most certainly say it would answer his purpose to take a supply (say, the minimum) and have a connection made. Then he would not need any spare plant, and would avoid stoppage for repairs. He would thus have available, as a safeguard, an additional supply—more than his own works produced; and in that way a very small load-factor would be obtained from that consumer. Exactly the same thing would happen with the small consumer. A comparatively small consumer, with (say) a 100 to 200 horse power engine, if he had a good load-factor, would find it more economical to have his own steam plant or his own producer plant. If he had a very bad load-factor (say 25 per cent.), he would do better to take it from the Company. So the Company would get the bad part of the business—the least profitable. That was why high rates have to be charged by companies supplying power. Allowing for a 33 per cent. load-factor, instead of 50 per cent. as was calculated on here, the net profit would be reduced by £60,000 a year.

That is all on the assumption that you can still go on selling sulphate of ammonia at £10 a ton when there is this large production?—The sulphate of ammonia is the whole basis. If the sulphate of ammonia market were to fall 25 per cent., as in 1895, the profit would be nearly all gone.

So that, even looking at it from the load-factor point of view alone, you think this scheme is financially unsound?—I do. I think the scheme is premature; and that instead of helping forward the distribution of gas from central sources, it will tend to delay the application of that principle for many years. I believe there is a great future in store for gas-engines. With large gas-engines—engines up to about 100-horse power—there is very little experience. In ten years' time, they will become much more general; and a scheme of this kind will have a much better chance of starting under favourable auspices.

Cross-examined by Mr. WALLACE: His evidence related only to power. With regard to heat, his view was that the gas had to be burnt; and whether in a gas-engine or a furnace, there was only so much heat to be got out of it. If the heating power of the gas in the gas-engine was less, he should naturally expect it to be less in a furnace.

Mr. WALLACE: Suppose you had taken into consideration the supply of this gas for continuous processes—like chemical processes, annealing processes, making bricks or iron—your load-factor would have been very different from 50 per cent.?

Witness: The load in such cases I suppose would be very much better. The higher the load-factor, however, the more likely it is that a probable consumer would supply himself.

In further cross-examination, witness said he drew a great distinction between towns and manufacturing districts. He did not say that in towns the distribution of power and light could not succeed; but the condition of manufactures in this country was such that, where power was the main source of revenue, such distribution was unlikely to get sufficient custom. With regard to heating, the problem was exactly the same as with power: Will it pay the consumer better to put up his own plant or to take Mond gas from the Company? There were Mond gas producers of 250-horse power, though not for the recovery of sulphate of ammonia.

Mr. WALLACE: For the carbonization of 1500 tons of coal a year, would it be worth while to recover the sulphate of ammonia?

Witness: I cannot say that.

Do you think that large plant of this kind would be useful for you in producing hydraulic power?—Certainly; if it were more economical. You have to show the manufacturer that it would pay him to get rid of his present plant to use this gas. If he puts in new plant and the gas is not successful, he loses the whole of his outlay. It is most important that there should be the element of success in the adoption of the new gas. When experience in the use of gas of this kind, and of the gas-engines required, is well established, there will be a much better case to be made out for the general distribution of gas in this district. Meanwhile, the average consumer will get along very well as he has been doing in the past.

Many people use gas-engines with ordinary coal gas?—Yes.

How is that?—Because they find it cheaper than putting up their own steam-engines. But they are small consumers.

Re-examined by Lord R. CECIL: I think that for over 100-horse power it is desirable to use steam rather than gas. Whatever the future may bring forth, at the present moment I do not think that a person will substitute a gas-engine for a steam-engine for over 100-horse power.

Mr. *Jabez Lones*, Mayor of Smethwick, who was examined by Mr. SHAKESPEARE, said the population of Smethwick was between 50,000 and 60,000. There were in the district a number of large works manufacturing different kinds of goods. Some ten or a dozen of these alone employed over 20,000 men.

Mr. SHAKESPEARE: Has there at any time been a single application or representation from the owners of any of these works saying that they wish to have the Mond gas in the district?

Witness: No.

In addition to this large number of big manufacturers, are there many small ones—some 60 or 70?—Yes.

Has any application been made by them for the introduction of this gas into the district?—No. I am the owner of large iron-works employing 400 workmen, and, speaking for myself, I have no desire that this gas should be introduced.

The gas undertaking of Smethwick belongs to the Corporation, does it not?—Yes. It was first acquired in 1876, being bought from Birmingham; and £56,090 was paid for it—including mains and meters.

New works have been put up; and the land on which they stand is the property of the Corporation. They have spent on the undertaking altogether over £183,000. So far as I am able to ascertain, the gas industry has been carried on to the satisfaction not only of those using it for lighting purposes, but also those using it for heating and power purposes. Of course, there have been a few complaints of the ordinary character. We contemplate increasing the capacity of the works, and shall be spending £60,000 or £70,000 on them. We are this season obtaining borrowing powers to the extent of £83,000. That is for gas-works purposes only.

Have you received petitions from persons residing in Smethwick opposing the introduction of this gas?—Yes. There has been one signed by 600 persons.

These petitions have been signed quite independently of any wish of the Council?—Certainly. The promoters of the Bill desire to acquire 32 acres of land which is leased to the Corporation; there being ten years of the lease to run. One of the petitions comes from the occupants of that land. The works of the promoters, if carried out, would very seriously interfere with the water and gas mains and pipes of the Corporation, and also with the tramways, which it is the intention of the Council to acquire. I do not know a single manufacturer or inhabitant who has solicited the Council to aid in the introduction into the town of Mond gas. All speak against it.

In cross-examination by Mr. WALLACE, witness said that, as to his attitude in regard to Mond gas, if he thought its introduction would tend in any way to the relief of the industrial population, he should be one of the first to welcome it; but as he believed it was not essential to the industries of the town, he opposed its introduction.

Mr. WALLACE: You do not want the gas in your own works?

Witness: No.

What does it cost you to produce power now?—I could not say without the figures. I have been using power 25 years. I have not thought it necessary to get the figures with regard to it. With regard to the existing gas supply, there have been complaints of the pressure being insufficient, in consequence of the great draught on the mains. The demand for gas, owing to the growth of the town and industries, has been very great; and pressure has been brought to bear upon us to improve the supply.

In re-examination, witness said that the gas-works were designed and laid down by Sir Frederick Bramwell. The pressure was not sufficient. The works were well managed.

Mr. MORGAN (a member of the Committee): Have you had any experience in connection with producer gas?—No. I understand that where iron-works have used producer gas, they have found it disadvantageous, and have abandoned it and reverted to the old system. No one in our district makes use of the gas.

When the question was brought before your Town Council, were they unanimously against the adoption of Mond gas?—Yes.

Mr. *W. J. Sturges*, Secretary to the Gas Department of the Smethwick Corporation, said the first complete year of working of the Corporation gas-works was 1882, when the amount of gas produced was 123,693,000 cubic feet. That quantity had increased to 292,026,000 feet in 1900. Last year the Corporation incurred an expenditure of nearly £1000 in laying mains to users of motive power. The output in 1900 was 24 million cubic feet for heating, and 21 million cubic feet for motive power.

Mr. *C. W. Pinkney*, a member of the Smethwick Council, said he had had considerable experience of gas-engines, and of various systems of producer gas. Producer gases for motive power purposes were all very much alike. Any producer gas making about 150 heat units per cubic foot was just about mechanically safe. By safe, he meant profitable and able to keep the engine continuously working. He did not think such weak gas should be conveyed through mains. If an unduly weak charge of gas should get into the mains, even those on works producing its own gas, it would cause considerable trouble; it would alter the proportion of gas to air, and the results were forward ignitions and explosions down the exhaust pipe. With a producer of the Dowson type, where the fuel was much richer than was proposed to be used by the Mond process, the difficulty could be met very much more quickly than with the Mond gas, owing to the richness of the fuel. He did not think there was any advantage in using Mond gas. Mond gas of 150 heat units per cubic foot was just possible for driving gas-engines; and that was just about the heat value of Dowson gas. It was easier to correct any error in Dowson gas than with Mond gas, owing to the richer fuel used in the former as compared with the latter. Wilson producer gas, as regarded fuel production, was about the same as that of Mond gas. Including interest on capital and depreciation, it could be made for about 1¼d. per 1000 cubic feet. Wilson gas for heating was about as good as Mond gas.

The CHAIRMAN: Are there any bye-products?

Lord R. CECIL: I think not.

In further examination, witness said the cost of Dowson gas, including everything, with fuel varying from 15s. to 21s. per ton, was about 1½d. or 2d. per 1000 cubic feet. It could not be made from bituminous slack. Anthracite was necessary; and this was the reason of the high price.

Cross-examined by Mr. WALLACE: None of the producer gases were suitable for large districts. He knew the Patent Rivet Company and Nettlefold's, of Smethwick; but he was not aware they wanted Mond gas. Avery's of Smethwick had a Dowson plant; but they had no difficulty which would not be multiplied by using Mond gas. If they had difficulty, it was because they did not understand the gas. He knew it was stated that Mond gas was one of the most regular of the producer gases; but he did not see why it should be so. He had experienced irregularity with Dowson and Wilson gas. The length of the mains would not produce irregularity; but if a bad charge of gas got into a long main, there would be greater difficulty in getting rid of it, because of the length of the main. If a long length of main was laid in a town, there would be disastrous results—seriously so, during the earlier stages.

This closed the case for Smethwick.

Lord R. CECIL: A Mr. Webber will be called on behalf of West Bromwich; and perhaps the Committee will take his evidence as being given for Smethwick and Oldbury as well as for West Bromwich. That will avoid calling him three times.

Mr. SHAKESPEARE (on behalf of Oldbury): As this inquiry has lasted such a long time, I do not propose to address any remarks to the Committee; but I wish to take advantage of the arguments already put before the Committee in opposition to the Bill.

Evidence was then called for Oldbury.

Mr. *A. Cooke*, Manager and Secretary of the Oldbury Gas-Works, said Oldbury acquired from Birmingham the right to supply gas for £27,339; but that did not include land and producing plant, which had since had to be acquired. The total amount laid out on the gas-works was £80,147; and the Council were spending about £7000 further. The loans owing at the end of December, 1900, were £62,841. The first whole year in which the Council made gas was 1882, when the make was 58,743,000 cubic feet. The output had increased to 108,311,000 cubic feet in 1900, of which 3,515,000 cubic feet was used by engines and 3,171,000 cubic feet by stoves. In December, 1900, there were 24 miles of main laid in the streets. The Council had also obtained a Provisional Order for electric lighting, which would shortly be put in force.

Mr. *Davies*, Chairman of the Urban District Council of Oldbury, said the Council had unanimously decided to oppose the Bill. So far as he was able to judge, the inhabitants of the district were also opposed to it.

This finished the evidence for Oldbury.

Evidence was then called on behalf of the West Bromwich Corporation.

Mr. *Thomas Hudson*, Treasurer of the Borough of West Bromwich, and Secretary to the gas undertaking of the Corporation, which they acquired from Birmingham in 1880, said the Corporation had expended on the gas-works £204,000, of which £182,000 was still owing. They had also spent £20,000 in reconstructing and remodelling the manufacturing plant, and a further £50,000 on penny-in-the-slot meters. The Corporation also owned the electric undertaking, from which they would be supplying electricity in a few days. The proposed Bill excluded many sections of the Gas-Works Clauses Acts of 1847 and 1871. The result would be that the gas concern owned by the Corporation would remain saddled with the onerous duties which the Gas-Works Clauses Acts imposed upon them, whereas their competitor would not have these burdens imposed. So far as competition was concerned, that would very heavily handicap the Corporation in its contest for the supply of gas. Their prices were reasonable and moderate; being, for illuminating purposes, from 2s. 9d. to 2s. 4d. per 1000 cubic feet, according to the quantity consumed, and for heating, power, and manufacturing purposes, from 2s. 3d. to 1s. 9d. The Corporation were prepared to supply electricity for motive and lighting purposes at prices as low as 1d. per unit; the price to the small consumer averaging about 1¼d. per unit. The Corporation anticipated a large demand for the use of their gas for fuel purposes in the future. Last year the demand for motive purposes increased 35 per cent. over that of the previous year. During the year ending March last, the Corporation sold 70 million cubic feet for other than lighting purposes, 25 millions being for motive power, 6 millions for furnace work, and about 39 millions for domestic cooking and heating. The total make last year was 327 million cubic feet, of which 309½ millions were sold. The difference between the two latter figures was loss, which was chiefly due to the district being undermined. That was a difficulty which the Mond Company would have to face. The Corporation attached great importance to the sale of gas in the daytime for power, and were doing all they could to encourage it, not only because of the yield, but because it occurred at a time when they had the expense of running the works, and had not a demand for illuminating purposes. The local authorities affected by the Bill had spent on gas undertakings about £1,500,000.

Cross-examined by Mr. WALLACE: He could suggest nothing which would enable the Corporation to reduce the price of coal gas to about 8d. per 1000 cubic feet, which would be the equivalent of Mond gas at 2d. If the Corporation had power to supply gas of lower illuminating power than at present, they could compete successfully with Mond gas.

Mr. *Henry Davey*, examined by Mr. RAM, said he was Consulting Engineer to Birmingham in connection with their water supply. The distribution in Birmingham was entirely by steam power; the hydraulic supply being given by means of gas-engines. As regarded water supply, there were a number of stations, some large and some small, which varied a great deal in economy of working. Most of the engines were very old and extravagant in fuel. At one of these stations, the cost of raising 1000 gallons 100 feet, with coal at 6s. a ton, was $\frac{1}{10}$d. At the hydraulic works, where they pumped for power and distribution by means of gas engines, taking the cost of the gas at 2s. per 1000 cubic feet, the same amount of work cost 0·44d. In other words, the cost by means of gas was 4½ times greater than steam. With regard to the cost of distributing gas for power purposes, he bore out Mr. Ellington's statements as to distribution increasing so much the price of the gas to the consumer. For small powers, it was quite as advantageous for the consumer to take his gas from the ordinary town supply as to take Mond gas at the prices mentioned in the Bill. Town gas had generally 4½ times the heating value of Mond gas; and taking the higher price for small powers specified in the Bill—viz., 4d.—and multiplying by 4½ produced 18d., at which price town gas had been supplied. Generally speaking, the price would be above 18d.; but the advantage of having a rich gas, which was so much more valuable for gas-engines than poor gas, would cause the small consumer to see it was better to take the town gas, even at a little higher price.

Mr. PLUMMER: Then you do not fear competition between ordinary town gas and Mond gas?

Witness: Not as regards small consumers.

In further examination, witness said that, in heat efficiency, the gas-engine had a decided advantage over the steam-engine. What the power user really bought was work in the form of heat; and whether

it was better to have a gas or a steam engine, depended upon the price at which he got his steam and the price at which he got gas. Using coal slack, usually sold at about 6s. a ton, in a steam-boiler, there would be 2,800,000 units of heat per shilling's worth of coal in the steam. Buying Mond gas at 3d. per 1000 cubic feet, for 1s. there would only be 600,000 units. So there was a four to one advantage in favour of steam.

Mr. RAM: Under what circumstances would it be commercially economical to use gas in large engines?

Witness: It would be commercially economical where you get the gas for nothing. I put it a little higher than that, and should say there are cases where it would be commercially valuable at 1d. per 1000 cubic feet; but I would not like to go higher than that.

In further examination, witness said he was Consulting Engineer to the South Staffordshire Mines' Drainage Commission. He had been consulted as to whether Mond gas could be used for pumping; and the information he gave was that the gas-engine in its present form could not be applied to deep-well pumping without the intervention of objectionable intermediate mechanism, which would involve a loss of power of from 30 to 50 per cent. Admitting that loss, there was no mechanical difficulty; but it would be impossible to use Mond gas at 2d. per 1000 cubic feet for the purpose.

Mr. RAM: Would the cost of distribution outweigh, even if it does not far outweigh, any economy which would be accomplished by having a large establishment as against many smaller ones for the production of Mond gas.?

Witness: Certainly; that is my decided opinion.

Mr. WALLACE (in cross-examination): Do you know of any existing steam-engine that will work for 300 days, for 12 hours a day, at a cost of £1 16s. for fuel?

Witness: Is that per indicated horse power?

Yes?—I think so,

For the whole year it would be £2 3s. 9d. ?—One of the most wretched engines we have is doing that at present.

Thursday, May 9.

Mr. *W. H. Y. Webber*, examined by Mr. GREIG, said he had studied the distribution and utilization of gas for all purposes. He had taken an active part in the introduction of gaseous fuel, especially in gas-works, and was the first to apply producer gas to the heating of retort-furnaces in London, as long ago as 1878. That practice had now become universal. He gave evidence before Mr. Oldroyd's Committee last year in support of the South Metropolitan Company's Bill for reducing the statutory illuminating power of their gas from 16 candles, which was previously the standard for all London, to 14-candle power, with the express object of cheapening the supply and rendering it more generally applicable for fuel. There was no insuperable obstacle in the way of applying ordinary gas for power. It was the best gas that could be employed for the purpose. The great obstacle in the way of the commercial, industrial, and technical development of town's gas for all purposes to which gaseous fuel could be profitably applied, was the maintenance of the parliamentary standard of illuminating power, which was an obsolete requirement. The initiative of the South Metropolitan Company last year had been followed in the present session by the Corporation of Glasgow; and under the new Scotch Procedure Act, they obtained a substantial reduction of their illuminating power with the same object.

The CHAIRMAN: Do you know to what extent?

Witness: From 20 candles to 16 candles.

Examination continued: The established success of the Welsbach incandescent system of gas lighting, which had been for some years in progress, had entirely changed the face of the regular gas industry of this and all other countries. It had abolished the necessity for any standard of illuminating power. Seeing that the present companies and municipalities and the users of gas had certain pipes and stoves, there was obviously a great advantage in retaining as much as possible the existing machinery for the distribution of gas. So that if they could get a gas which was to be distributed in much the same way, there would be a great advantage over introducing a fresh one with a new method of distribution. There was absolutely no room, either in the streets or in the technical field, for a second gas industry of a different character from that which was now in possession of the whole country. It was a preposterous proposition. In his opinion, no new invention was necessary to make a beginning in this direction.

By Mr. PLUMMER: He was speaking from the point of view of all uses to which gas could be profitably applied. It was clearly advantageous that gas supplied to a workshop or factory should be suitable for all purposes. It was positively the fact that nothing but town's gas—except water gas—had sufficient heat of flame to permit of welding under the conditions of the open hearth. Coal gas was largely used for that purpose at present. There was scarcely a works where ordinary gas was used for lighting, which did not also largely use it for some other purposes.

Examination continued: All the province of applicability of gas was open to the existing companies, without the introduction of any new gas. His view was that anything which would injure the established undertakings would be a fatal step. He thought that any competition, in the same line, with the existing statutory gas undertakings was contrary to the whole practice of Parliament for the last fifty years; and such competition as was threatened was most outrageous. Every customer the Mond Company would gain, would be a customer lost to the existing gas undertakings. It had already been given in evidence that the large manufacturer—the man who used enormous quantities of heat—could make his own fuel very much cheaper than he could buy it from anyone. The local authorities and gas companies would be justified in reducing their price to any point—fighting the competition, in fact, in the way that competition was fought, if necessary—in order to retain their position. He thought it inadvisable that a scheme of this kind should come into the district. The advance of gaseous firing in substitution for solid-fuel firing was blocked for many years by the existence in the text-books of a strong statement against it. This was altered in practice by Herr Siemens proving that what was theoretically wrong was practically right, in certain circumstances. He saw no attractiveness in a proposal under which the manufacturer would pay 2d. per 1000 cubic feet for gas which he could make for himself for ¾d. per 1000 feet.

Mr. PLUMMER: If that is so, why do you fear the competition?

Witness: I am not speaking now of manufactories. I do not think large manufacturers would ever go in for any extraneous or foreign supply of gaseous fuel. When they want it on a large scale, they can make it more cheaply for themselves, and can have it so much more under their own control, which is a very serious consideration.

Examination continued: Generally speaking, he did not think it was economical to use gaseous fuel without regeneration, unless it was a very strong fuel—such as town gas or water gas, used for a particular local application. In his opinion, it was necessary that poor gas should be used hot. This was the great point of the success of the Siemens and other industrial applications of gas on a large scale—that the gas was used before it had time to lose the sensible heat of its origin in the producer. He had considered the Bill from the point of view of public security with reference to the absence of provisions for constant pressure. He thought it was a very serious proposal indeed that enormous mains should be laid all over the district, partly inhabited and partly not inhabited. Altogether apart from the liability of the joints being drawn owing to mining subsidences, very grave insecurity would be created if this gas were ever allowed to be supplied except under the most stringent penalty clauses, providing that it should be always constantly furnished under pressure. This was owing to the fact that a vacuum might be created in the street-mains which would suck back air into the pipes. If there were ever to be a negative pressure in the pipes, the risk of a terrible gas-main explosion would be very real and serious. He thought, with Mr. Woodall, that the omission of gas-holders was very serious. In the interests of public security, apart from anything else, there must be a constant supply under pressure night and day. This was not the first time fuel gas companies had been started; a number of instances having occurred in America. The experience of these companies had in every case been absolute and unmitigated failure. There had been at least 27 of these companies. He had studied the Mond patents referred to in the Bill; and he believed none of them had been tested in the Law Courts. He did not think they were worth anything at all—certainly a good many of them were inapplicable to the circumstances of the present Company.

Cross-examined by Mr. WALLACE: He could not say Mond gas would not be a suitable commodity to supply; but he saw no difference between it and any other producer gas which would make it more applicable to such businesses as were carried on in the district, and those other gases certainly were not suitable. He thought Mond gas a very bad fuel gas. He did not believe producer gas was worth carrying about. Questioned as to whether Mond gas was not the only producer gas which was cooled in the process of manufacture, witness said that Dowson gas and Pierson gas, which were largely used on the Continent, were treated in all respects like ordinary gas, and were washed and cooled; it being found necessary and desirable for this to be done. One ground of opposition to the present scheme was the large amount of competition it would bring to the existing gas companies; but if the authorities were not making their own gas, they would be equally justified in opposing the enormous experiment involved in the scheme, having in view the vagueness of its advantages and the risk to public security. An explosion might take place; and if leakage occurred, there would be a large escape of gas, because of the pressure at which it was proposed to supply it. He did not propose to distribute water gas through the streets, but coal gas enriched with water gas, until Parliament would allow gas companies and local authorities to supply gas without any standard of illuminating power, or with a reduced standard, as obtained now in some places. The calorific power of the lower illuminating power gas was very little less than that of the most expensive gas which could be made.

Mr. WALLACE: Unless you can do away with the distribution of gas of high illuminating power, you could not hope to compete with Mond gas?

Witness: Yes; in the case of West Bromwich we could practically compete with you on the present footing.

What is the price of the West Bromwich gas?—At present it is 1s. 9d. for power purposes—that is the advanced price, less 5 per cent. You admit that there is 4½ times the fuel value in West Bromwich gas that there is in Mond gas. They are not very far apart, if you adopt the prices mentioned in the Bill. Taking 4d. per 1000 cubic feet for instance, 4½ times that is 18d.; so that we are very near you now.

But that is the maximum price in the Bill. If you were to take the maximum at which you supply, which is the proper standard, the result would be very different?—I do not think the maximum the proper standard.

They say they are prepared to supply at 2d. per 1000 cubic feet?—That is not in the Bill.

Then at the higher prices you are not afraid of competition?—It would be an intolerable nuisance.

You could easily meet it?—We could meet it. We could sell gas to people at 1s. per 1000 cubic feet to-morrow.

Then really, from your point of view, you do not fear competition at all?—No. If you force competition upon us, we will meet you.

Mr. PLUMMER: If you sell gas at 1s. per 1000 cubic feet, it will be at the expense of the rates?

Witness: Not necessarily. That is a point we have never had occasion to try. An electricity supply organization, whether company or municipality, think themselves quite justified in offering a supply for power purposes for one-fourth of what they charge for lighting. Obviously they cannot make it at that.

Mr. WALLACE: They fill up their load by supplying power when it is not being used for lighting, so that they can produce it at 1d. per unit, and sell it at 2d. or 3d., when their ordinary price is 4d. Thus they do make a profit.

Witness: I have not heard it given in evidence that they make a profit at 1d.

By the CHAIRMAN: If it were found necessary to retain the power part of their business, for that small portion of their supply established gas companies could cut their price to 1s. per 1000 cubic feet.

Mr. WALLACE: You think the increased business you would do,

because of the competition, would enable you to sell the gas at a lower price?

Witness: I think we could sell the gas for fuel purposes, and especially for driving gas-engines, cheaper than we do now, without its costing the ratepayers anything.

Re-examined by Mr. RAM: If the Bill passed, the gas suppliers would reduce their prices. If two companies—an electric lighting company and a gas company—were competing against each other, and prices were cut, the consumer would, for the time being at least, get the benefit. But if a company were competing with a corporation, and the corporation had to cut their rates below the price at which they could commercially produce gas, there would have to be a rate-in-aid. That would come out of the pocket of the ratepayer; and so the competition would cease to be a benefit, because what he gained by the cutting of the prices he would lose by the rate-in-aid.

By the COMMITTEE: He did not think a corporation would be justified in supplying gas to a consumer under cost price. The effect of passing the Bill would be that the Corporation would at once reduce the price of gas to a figure which would at once stave off all possible competition.

Mr. RAM then addressed the Committee on behalf of the Corporation of West Bromwich. He said admittedly the whole proposal of the Bill was in the nature of an experiment; and the Committee therefore ought to have the fullest and amplest evidence regarding everything which had been done with regard to Mond gas. But the Committee were left virtually bare of evidence on this point; and therefore they had to deal with an experimental matter, as to which they had no actual evidence of practical working in any but Brunner, Mond, and Co.'s works. He proceeded to review the evidence of Mr. Davey and other witnesses, to show that the gas was not suitable for application to diverse uses, and that the great cost of distribution would eat up all probability of supplying it at a price at which consumers could take it with advantage. Even if it could be supplied at a reasonable cost, it would not do the work which the manufacturer could now do with steam. It was admitted, in the calmest and fullest way, by the promoters that they took power to supply any producer gas. The gas which they might decide to supply might be a dangerous gas, which, if it came before Parliament directly, would never be sanctioned. And further, the promoters sought to tie up the whole district, and to make it impossible for any other promoters, who might have invented a better gas for the supply of power, to come in. They had relieved themselves of the usual burden to supply gas within a certain time; and though they might break up the roads, they were not compelled to supply except the mains were within 25 feet of the consumer, and the consumer applied to them. Another unique power which they sought was the right to exclude others from the use of their patents in the district. This was abnormal, and a power which Parliament had never given No other gas-works in the country had the exclusive use of any patents. Parliament had always been most careful, in dealing with municipalities, to see that their rights were safeguarded; but here the promoters wished to override and disregard the views of the authorities whose districts they affected. In the case of the South Wales Electric Power Bill last year, Parliament protected the authorities absolutely. Although the promoters were permitted to lay their cables, they were not allowed to supply a single volt of electricity except with the consent of the authority whose area was being invaded. If the Committee passed the present Bill, he asked them to give the same power here. If competition took place it would be most unfair, because the Mond Company would be wholly unfettered, and they would not be bound by the provisions usually inserted in Gas Acts. The Corporation could not, of course, supply gas as cheaply as they would like, so long as they had to supply it of a high illuminating power. If they were allowed to reduce the illuminating power, they could make gas much cheaper. Another fetter of the Corporation was that they had to supply always under pressure; the promoters had not. Competition would be most unwise and unprofitable for the district. There was no provision in the Bill for gasholders, though all the witnesses for the opponents agreed that it was only by storage that adequate permanent pressure could be maintained. It was admitted, also, that if this pressure was not maintained, atmospheric air would enter the mains; and the result would be serious. He asked the Committee to reject the Bill.

Professor *Vivian B. Lewes*, examined by Mr. MOON, on behalf of the Gas Companies, said the Bill would undoubtedly affect the Companies to a certain extent. For instance, the Willenhall Gas Company supplied something like 30 per cent. of their make of gas for fuel and power purposes; and to the extent that this gas was now used for power, it would be supplanted, if the Mond scheme became a success. The minimum supply was to be a million cubic feet, which meant the supply to an engine of 5 or 6 horse power. This was the size of a considerable proportion of the gas-engines in the district. He was afraid Mond gas could not be successfully supplied. In his mind, there was not the least doubt that fuel gas would be the fuel of the future; but he did not think Mond gas was of a character to lend itself to centralization and distribution. It might be utilized in the works in which it was produced; but it did not lend itself to distribution at a distance.

The CHAIRMAN: Can you give any special reasons for that opinion?

Witness: If you are going to distribute a gas generally to a large district, you must be able to supply the consumers in that district with the same amount of power, whether it be heat or energy, at a price lower than the price at which heat can be generated. The British manufacturer is very conservative. He likes to keep the controlling factors of trade in his own hands; and while he can make his gas, and get his power in his own works, in his own way, at a price which would be as low as the terms on which it is offered to supply fuel, he will not take fuel gas.

Mr. MOON: I gather your view is that it is not the practical difficulty in the distribution of the gas which is in the way, but that it is the cost for an equal amount of heating power which the manufacturer could produce on his own premises?

Witness: That is so.

Do you think that, at 2d. or 2½d. per 1000 cubic feet, it could compete with the other forms of fuel gas?—I do not think it could, either with fuel or fuel gas. Of course, there are cases in which it could compete, but only very few—not sufficient to make this a profitable scheme.

Further examined: Water gas was a fuel gas which might come within the term "producer gas" in the Act. Many of the producer gases could be generated in manufacturing works, even though the works were not very large. A manufacturer could produce them as cheaply as he could have Mond gas supplied to him by such a company as this. Siemens gas would be very much cheaper than Mond gas. A manufacturer wanting gaseous fuel would be more likely to manufacture Siemens gas than to take Mond gas from the Company; and there would be a further advantage in this, because the Siemens gas would be used within about 100 yards of where it was produced, and thus would be burned while hot. The cost at which fuel gases could be produced varied considerably. He did not consider the expectations of the promoters, as to the amount of gas for which they would find a market, were likely to be realized. He was not aware that there was any large number of open-hearth steel furnaces in South Staffordshire, which were the kind of furnaces which would use gas of the Mond type. Blast-furnaces made their own gas. He supposed there were more puddling furnaces than any other in the district. A good many attempts had been made to use gaseous fuel in these; but they had not been successful. The result was that the number of iron-works which would take the Mond gas would not be very large. Where the works were of sufficient size to use gaseous fuel and to have the open-hearth furnaces, they would possess their own producer plant. They could produce Siemens gas at under 1d. per 1000 cubic feet. It would probably be said that the Mond gas was of greater purity, and that the sulphur in the others would be a great drawback; but this was a matter of selecting the slack. In South Staffordshire, he was told, there was plenty of slack containing only 3 per cent. of sulphur. The same argument applied to many other trades in the district. They had any amount of slack on their premises, which it would be more economical to use for steam purposes than to get a supply of gas from the Company. He thought the field for Mond gas was a limited one, and unsatisfactory because it would contain a varying load, which would make the gas expensive to produce. The great drawback to Mond gas was its calorific power, and the low intensity of the flame heat.

Mr. MOON: Supposing the large customers are not to be found in this district, it will result in the competition being thrown back on the small customers whom the gas companies are now supplying?

Witness: Yes.

Is the consumption of gas with those companies for power purposes largely increasing?—Yes; and the whole tendency is to reduce the illuminating power, so as to be able to supply it at a price at which it could be used for fuel or power purposes.

If the Mond Company were to supply water gas as a producer gas, could it with great ease be converted into an illuminant?—Yes; you have only to burn it with an incandescent mantle to get as good a light as with coal gas. If they were to adopt any such process, the Mond Company would compete directly with the existing suppliers; and this was quite possible in the future.

Cross-examined by Mr. BAGGALLAY: He had not seen Mond gas at work. If the Bill were passed, the Mond Company would use every endeavour to get consumers to take their gas.

Mr. BAGGALLAY: But surely, if we are successful in supplying Mond gas cheaper, the customers will leave the Willenhall Gas Company and come to us?

Witness: Undoubtedly.

Is that for the good of the manufacturer taking gas?—Yes.

You would deprive the manufacturer of the advantage of getting cheap gas, and bolster up the Willenhall Gas Company's undertaking?—The Willenhall Gas Company have got their charter; and if the Committee pass this Bill, you will be encroaching upon the parliamentary rights which have been granted to the Company.

You would have Parliament protect a company because they have once got power, even though it may be to the detriment of the manufacturer?—I say that, if Parliament has once given certain protection and powers, and they are to be encroached upon, these powers and protection are not of much use to the supplier.

Cross-examination continued: He did not think Siemens gas was the gas of the future. The gas of the future would be more of the character of a water gas, in which the constituents were entirely combustible. Water gas was now being used for power and fuel purposes at several places in Germany. He would not object to distribute this gas for manufacturing, but would not do so for domestic purposes. It contained 40 per cent. of carbonic oxide. The gas of the future would not be manufactured on the premises, but at some central station and distributed.

The case for Handsworth was then proceeded with.

Mr. *Henry Ward*, examined by Mr. YOUNG, said he was Chairman of the Handsworth Urban District Council. The population of the urban district of Handsworth was 52,900, the rateable value £226,800, and the area 3647 acres. The general character of the district was residential and agricultural; the number of factories being exceedingly small. The largest was Kynochs, which was distant about 5 miles from Smethwick, where the nearest generating station would be. His Council, however, strongly objected to the streets being torn up, as they were already very crowded with mains. He felt quite sure the nature of the district would not alter in the future, so as to make it a place for large works. Handsworth had neither canal nor railway facilities to bring business into the district. The Council were unanimously opposed to the proposal; and he believed the feeling of the inhabitants was in the same direction.

The Chudleigh Gas-Works have been taken by Messrs. Willey and Co., of Exeter, on a lease; and the price of gas has been reduced. Mr. H. A. Crook retains the management.

HOUSE OF LORDS COMMITTEE.

Tuesday, May 14.

(*Before Lord* PIRBRIGHT, *Chairman, Lord* SAYE AND SELE, *the Earl of* BUCKINGHAMSHIRE, *Lord* CARNWATH, *and Lord* NORTHESK.)

ELLAND GAS BILL.

This was a Bill to consolidate the existing capital of the Company upon a 5 per cent. basis, some of it being 2 per cent. preference shares. Additional capital to the amount of £45,000 was asked for, with one-fourth loan.

The promoters were represented by Mr. BALFOUR BROWNE, K.C., and Mr. WAUGH; while Mr. HONORATUS LLOYD appeared for the Elland Urban District Council, who were the only opponents.

Mr. BALFOUR BROWNE, who opened the case for the Bill, said the Company was established by Act of Parliament in 1861, to supply gas in an area of about 8000 acres. The number of people at present being supplied was 30,000. The total capital authorized was £55,000, which had been raised on the most economical terms. This capital had been exhausted; a great increase of business on the part of the Company having followed a large growth of prosperity in the district. The Company had overspent their capital by £2280; and it was therefore absolutely necessary that they should come to Parliament for sanction to increase it, because the business was still growing very largely. By the Company's Gas Order of 1878, the standard price for gas was fixed at 4s.; and the Company had worked so economically that the price they charged before the coal famine was only 2s. 6d. per 1000 cubic feet. Even now it was only 2s. 9d. The Company worked under the sliding-scale. Premiums of £2240 had been received on the sale of shares, which went into the capital of the Company, and bore no dividend. The Company required about £45,000 of additional capital within the next ten or twelve years. They also wished to convert their capital, in order to make it uniform, as had been done in a great number of other cases. The old 10 per cent. ordinary stock of £25,010 would be converted into double the amount of 5 per cent. stock. The 2 per cent. preference shares amounted to £6990; but as the dividend was to be doubled, the £6990 would only stand at £3495. The 5 per cent. preference share capital, at present amounting to £3000, would be reduced to 4 per cent., and would therefore stand at £3750. The 4½ per cent. preference share capital, amounting to £17,760, would be reduced to 4 per cent., and would therefore stand at £19,980. He explained that it would not benefit the Company to raise further capital, except that it would enable them to continue doing their duty to the public. The very best thing that could happen, as regarded the present shareholders, would be for the Company to raise the future capital by borrowing; but they were not allowed to do this, and therefore the Company proposed to raise the capital by preference stock. Part of the area of supply was the little district of Skircoat; but this had recently been transferred to, and had now become part of, the borough of Halifax. Halifax wished to supply gas in the district; and the Company had agreed to sell the pipes and other apparatus in that area to them for £1100. There were several local authorities in the Company's area of supply; and all, with the exception of Elland, were apparently satisfied with the Bill. In their petition, Elland complained that the Company had not only negligently broken up and reinstated the roads, but that on many occasions they had broken them up without notice. Counsel believed, however, that never, except in cases of emergency, had this been done. Then they complained of the bad quality of gas supplied to the consumers, and of the defective power and purity of the gas. He would leave this to be answered by the engineer. The petitioners also made a number of allegations for which he thought there was no foundation. In particular, they said the standard price was excessive and burdensome to the consumers. Apparently the petitioners wanted to alter the standard price; but this would be a breach of a parliamentary bargain. Holders in the Company had bought shares on the strength of this standard price; and it would be a great breach of faith if it were altered. Then the petitioners said that the standard of illuminating power and of pressure was too low; that provision should be made for testing the pressure of the gas without giving notice to the Company; that the Company should be required to provide a large map showing all the mains, pipes, and underground works in the roads and streets; that provision should be made for the investment of the insurance and reserve funds; that security should be provided that all penalties incurred by the Company should be borne by the Company, and not by the consumers; and, further, that provision should be made for restricting the issue of the original capital, and securing that all sums should be borrowed by auction or tender. Lastly, the petitioners considered it would be of public advantage if the undertaking were transferred to them; and they suggested that the present would be an appropriate time to insert provisions with regard to such transfer. Apparently Elland wished to obtain a clause enabling them to purchase the whole undertaking. Such a clause had never been put upon any statutory company. Very often local authorities had come to Parliament with a Bill for the purchase of a gas company's undertaking; and if the company had not been doing their duty, Parliament had given the power. But in this case the Local Authority had no Bill; and he did not know that they had even consulted the ratepayers.

Rev. Mr. *Aspinall*, the Chairman of the Company, examined by Mr. WAUGH, bore out Counsel's opening statement. He said the interest on the capital under the Order of 1878 was not to exceed 5 per cent.; and therefore, by issuing it at 3½ and 3¼ per cent., the Company had effected a considerable saving to the consumers. The Company also had power to form an insurance fund amounting to £2750; but they had only placed to this account £2000. It had remained at that figure in order to keep the Company's expenditure down, and to give the consumer the full benefit of cheap gas. The order also authorized a reserve fund of £5085. The interest from both these funds was applied to diminish the price of gas. With gas at 2s. 9d. per 1000 cubic feet, the Company were paying 13 per cent. free of income-tax, or, adding the income-tax, about 13¾ per cent.; whereas they were entitled to divide 14¼ per cent. The Company required additional capital at the present time to meet the growing requirements of the district, and they asked for power to raise an additional sum of £45,000 by stock. They had conducted their business economically and without complaint. The Elland Council desired the insertion of a clause permitting them to purchase the works. As a Company, they did not desire to sell.

Cross-examined by Mr. LLOYD: There had been complaints with reference to the quality of gas supplied, the pressure, and also the state in which the roads were left by the Company; but whenever complaints of this character had been made, they had received immediate attention. By the Act of 1861, the Company were authorized to borrow a sum of £7000, which was raised at under 4 per cent. This, witness admitted, was subsequently converted into share capital bearing 10 per cent.

Mr. LLOYD: And the Company have, in fact, paid, as you have said, 13½ per cent. on the £7000 which you raised at under 4 per cent.?

Witness: I suppose that is so.

Does that strike you as being an economical method of carrying on the business of the Company?—I think that it was the best under the circumstances.

In further cross-examination, witness said the reserve fund was invested in the Company. The interest on it benefited the consumer, by enabling the Company to supply gas at a cheaper rate. It was not disposed of in dividend?—The Company had never paid up to their maximum amount of dividend. The Company ceased to carry the interest on the reserve and insurance funds to revenue in the accounts of last December. He believed this was because the Auditors thought it would be more regular. He agreed that the Company were authorized to make a reserve fund and invest it in Government securities; but they were not compelled to do so.

Mr. LLOYD asked whether the promoters sought power to convert the proposed loan capital into share capital. He pointed out that they were incorporating that part of the Companies Clauses Act which would enable them to do so.

Mr. WAUGH said the promoters had no desire to do this.

Mr. LLOYD did not suggest that the Company, in converting their mortgage debt into share capital, had acted illegally; but he wanted to protect the consumers, and prevent it occurring again.

Mr. WAUGH said he was told the power suggested was not contained in the Bill; but if it was, he would be quite willing to give the protection sought.

Further cross-examined, witness said the Company had paid the income-tax on the ordinary shares in addition to the 13 or 14 per cent. When they increased the price from 2s. 6d. to 2s. 9d. per 1000 cubic feet, they not only increased the price to the Local Authority, but ceased allowing the discount. This applied, however, to all consumers. The discount to the Local Authority amounted to 15 per cent. He agreed it was advisable that the Local Authority should have the means of properly testing the pressure of the gas.

Mr. LLOYD: Do you know the Local Authority suggest that provision should be made for testing the pressure of the gas without giving notice to the Company, and at any of the lamp-posts. Do you seriously object to that?

Witness: I object to it in this way—that if penalties were sought to be inflicted, the Company ought to have a representative present when the tests are made; and the district being so wide, you cannot have a man ready at any moment.

Of course, if you have notice, the astute Manager might put the pressure on; and the difficulty might thus disappear before the testing took place?—I do not think that is very likely to happen.

You know, do you not, that in Elland there is a strong feeling in favour of the purchase of the gas-works?—I am told so.

Do you know the same feeling prevails in Greetland?—No.

You heard Mr. Balfour Browne tell their Lordships that to put a purchase clause into a Bill promoted by a statutory company would be unprecedented?—Yes.

I want to shorten matters; and I agree with him. Therefore I will not ask for the insertion of a purchase clause. But I am going to ask that a clause should be inserted in the Bill providing that your undertaking shall not be enhanced in value by the passing of this Bill—if it does pass—in the event of the Local Authority coming in the next session of Parliament to purchase?—I think that would be very unfair to the shareholders.

Why?—Because the value will be enhanced; and why should they not have the benefit? There is an agreement with Stainland that they should be in no worse position in the event of the Company's undertaking being purchased by the Elland Local Authority.

In re-examination, witness said the reserve fund had gone to reduce the price of gas; and the consumer had got the benefit of this to a far larger extent than had the Company in any increase in dividend.

By the CHAIRMAN: The reserve fund was invested in the works. They considered it was there, just as if it were available in money.

The CHAIRMAN: Suppose the Company got into financial difficulties. You fall back upon your reserve fund; but if your reserve fund is in the works, you could not fall back upon it. It is not, in the usual sense of the word, reserve?

Witness: No.

The same applies to the insurance. What is the object of the insurance fund?—I suppose the object of the insurance fund is to enable us to equalize dividends.

In sound business, an insurance fund is money to insure a certain risk?—Yes.

If that is invested in the enterprise, how can you guarantee that risk?—Of course, that is the point.

Mr. *Robert Porter*, Engineer, Manager, and Secretary to the Gas Company, examined by Mr. WAUGH, said the consumption of gas during 1891 was 69,618,000 cubic feet. Since then there had been a steady increase; the output in the year 1900 being 100,832,000 cubic feet, which showed an increase for the nine years of 45 per cent. The number of consumers increased in the same period by nearly 32 per cent. He thought it quite possible an even greater increase might take place in the future, because a large industry had recently been established in Greetland. The gas sold by the Company during the past five years had been taken in the following proportions: Elland 56·74 per cent., Greetland 23·59 per cent., Stainland 18·37 per cent.,

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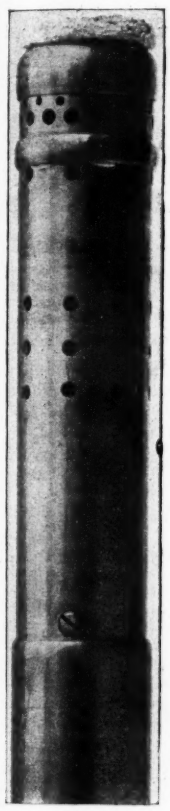

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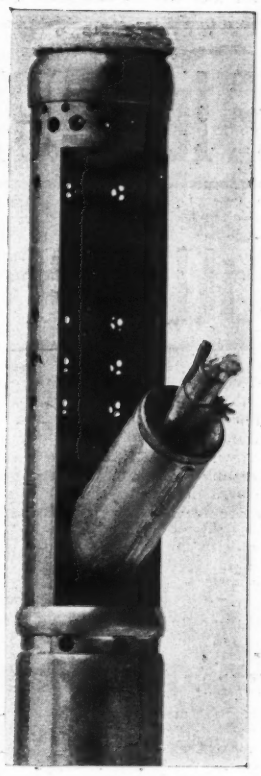

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Skircoat 1·26 per cent., and Fixby 0·04 per cent. The gas-works had been conducted efficiently and economically; and the Company had never had any serious complaint about the management. Whenever complaints had been received regarding the breaking up of the roads, they had been immediately attended to; and there had never been even a threat of proceedings against the Company. The Company had expended all their capital, and were now in debt; and to meet the growth of the district it was necessary they should have further money.

Cross-examined by Mr. LLOYD: The Company had had complaints about the quality of the gas; but there had been no foundation for them. The accounts had been kept in the usual form. It was customary to have the insurance fund and reserve fund invested in the business, and put into the loan account. He could give instances of other companies where this was done; but he had not their accounts before him. The insurance fund was established to meet a liability in case of accident. It was invested in the works; and if an accident took place at the present moment, the Company would draw on their bank to the amount of the insurance fund, and get a temporary loan to replace the amount taken out, if necessary.

Mr. LLOYD: The thing is a farce?

Witness: No; it is not. We should issue capital so as to replace that fund.

Suppose you had such an accident as should blow your works to pieces, would you draw on the bank?—You are supposing an impossibility. I say we have not done wrong in employing our reserve fund in our works. We had Counsel's opinion on that.

If it was so usual, you did not want Counsel's opinion upon it. You felt a bit shaky. I want you to explain the economy of lending this to yourselves at 5 per cent.?—If we take the reserve fund away, we have that money to provide.

You would raise the money at 3½ per cent.?—Yes.

And your reserve fund would be invested to bring in 2¾ per cent.?—Yes; and the one would be set against the other.

The consumer would pay the difference. As it is the consumer pays 5 per cent?—No; he pays nothing.

You put it into your business, and pay 5 per cent?—And bring it back again.

Further cross-examined, witness said the stock of residuals was not brought into the accounts. That was often done. The accounts were audited by shareholders in the Company. He held that the standard price should not be touched. He did not think there could be any objection to apply a new standard to new capital. The promoters had made a suggestion that this capital should be issued as preference stock.

Mr. LLOYD: I find your Bill says ordinary stock or preference.

Mr. WAUGH: We are prepared to confine it under the Bill to preference stock; so there will be no reference to standard price. That is, it will be 4 per cent. preference stock subject to the auction clauses. But we do not want any alteration in regard to the old capital.

Mr. LLOYD: That will satisfy me on this point.

Further cross-examined, witness said that Messrs. Dempster and the Local Authority of Elland each consumed about 4 million cubic feet of gas last year. The former were charged 2s. per 1000 cubic feet, and the latter 2s. 1½d.

Mr. LLOYD, in reply to the Chairman, said that now Mr. Waugh had stated that he was willing to issue the new capital only as preference stock, he did not care much about the standard price.

Mr. WAUGH: I think I ought to make an explanation. I have only just been put into possession of the fact that the Lord Chairman of Committees has amended clause 6 of the Bill by adding a restriction so that not more than £22,250 of additional capital can be raised by preference shares or stock. We ask for £45,000 of additional capital. To meet my friend, however, I would consent to raise the remaining £22,500 as ordinary capital under the auction clauses at 5 per cent.—the sliding-scale not to apply at all.

Mr. LLOYD: That will satisfy my clients equally well, so that I need not trouble about the standard price.

Re-examined: The reason they supplied at the cheap rate to Messrs. Dempster was not merely because of the larger quantity of gas they took, but because they consumed it during the daytime all the year round; whereas the Local Authority only took gas at night, and during the winter months. The Company had made tests, but had found no justification for the complaints of bad quality. There was nothing to indicate that the Company had not maintained their standard of illuminating power. The Chairman of the Elland Council had stated publicly that the quality of the gas according to the Council's own tests was over 16-candle power.

This closed the case for the Bill.

Mr. LLOYD then addressed the Committee on behalf of the Elland Urban District Council. With regard to pressure, they desired to have an opportunity of testing the gas without notice to the Company, and at any of the lamp-posts within the district. The Chairman of the Company objected to the Council making tests without giving notice; but the Council rather insisted that they should not give notice, because if they did so the object of the test was liable to be defeated. If it were necessary to give so many hours' notice, it would probably be found that when the test was made the pressure, whatever it had been, would be correct. A change in the pressure could be made instantaneously. Then the Council asked for a map showing the pipes, mains, &c., in the streets. It was very desirable that the Council should know where the existing mains and pipes in the roads were, so that new mains might be laid without inconvenience. The Council, therefore, ought to have power to take a copy of the map which the Company had in their office. The Chairman did not object to this. With regard to the reserve and insurance funds, the Council desired it to be made absolutely clear that there should be reserve and insurance funds in the ordinary acceptance of the terms. He did not think it was necessary to dilate on this subject. The Council held that provision should be made securing that all penalties incurred by the Company should be borne by the Company, not by the consumers. The Council further asked that provisions should be made in the Bill for restricting the issue of the additional capital, and providing for the raising of all sums authorized to be borrowed by auction and tender. He assumed that the promoters would agree to the sums to be borrowed being raised under the auction clauses, as well as the clear capital.

Mr. WAUGH: I am told that such a thing has never been done with regard to loans. It is to the interest of the Company that they should obtain their loans as cheaply as possible. We doubt whether the auction clauses in regard to loans would be of any assistance at all. In fact, we think they would hamper us. We borrow at 3¼ per cent. without any expensive auction. Why should we be put to the expense of holding an auction, when we can raise it at so cheap a rate?

The CHAIRMAN: Would not a clause to the effect that no money should be borrowed above the rate of 3 or 3¼ per cent. do?

Mr. WAUGH: If you would say 4 per cent., I would not object to that.

Mr. LLOYD (continuing) said that he agreed with Mr. Balfour Browne that it would not be fair, or in accordance with precedent, that a clause should be inserted authorizing the Local Authority to compulsorily acquire the concern. But what he asked had often been done before—viz., that the Company's hand with regard to the expenditure of capital might be held until next session, in order to enable the Local Authorities of Elland and the adjoining districts to come to Parliament, if they desired to do so, and ask to be allowed to purchase the undertaking, it being understood that the concern should not be enhanced in value in the meanwhile in consequence of the passing of the present Bill. If such a clause were inserted, the result would be that, during the next twelve months, they could raise so much of the capital as the Committee authorized under this Act for the purposes of carrying on the business, but they could not rush into an unnecessary expenditure of capital during that time. Elland and Greetland were both desirous of purchasing; and there was little doubt that his clients would be in Parliament next year for this purpose.

The CHAIRMAN: Who is to decide whether the expenditure is legitimate or not?

Mr. LLOYD: I do not think any practical difficulty arises. Perhaps the better way would be to say that they should not expend more than a certain amount of capital in the next twelve months.

Mr. WAUGH objected to the proposed clause, because it would prejudge the whole question, if the Local Authorities did come to Parliament with a proposal to purchase. If the clause were inserted, any Committee they went before next session would be told that it was inserted because the present Committee thought that a case had been made out which justified the compulsory purchase of the undertaking. He submitted there was no evidence before the Committee which would justify them in coming to the conclusion that a statutory company, exercising their ordinary powers, and not in default, ought to be compulsorily purchased, merely because some portions of the district were at present of opinion that they would like to do so.

The CHAIRMAN (to Mr. Lloyd): Do you suggest that the petitioners in this case should have the power to say that the Gas Company should not raise any extra capital except with their consent—that is, the consent of the Local Authority.

Mr. LLOYD: Yes.

The CHAIRMAN: I do not think that would meet the view of the Company at all.

The Committee found the preamble of the Bill proved.

Wednesday, May 15.

The Committee to-day proceeded to adjust the clauses. With regard to loan capital which might be raised under the Bill, it was directed that no higher rate of interest than 4 per cent. should be paid; and the word "shall" was substituted for "may" in the clauses authorizing the formation of the insurance and reserve funds—the object being to make it compulsory that these funds should be invested in "Government or other securities," and to prevent them being used in the works of the Company.

Mr. LLOYD then sought sanction for an amendment under which the Council might test for pressure without giving notice to the Company. The Chairman of the Company agreed that the proper method of testing for this purpose was to go to the nearest lamp-post; and the point was whether or not the Local Authority should be entitled to test without notice.

Mr. WAUGH urged that it would not be right that the Company should be rendered liable to penalties by testing, unless they were present at the tests to see that they were properly carried out. He did not object to the tests being made, on reasonable notice given.

Mr. LLOYD said the pressure could be altered at a moment's notice. If therefore the Council had to give reasonable notice, the object of the test might be defeated.

The CHAIRMAN: I think we can hardly assume *mala fides*. We will leave it as it is.

An amendment was then agreed to, providing that penalties which the Company might incur should be paid out of the funds which would otherwise be available for dividend.

On behalf of the promoters, a clause was submitted providing that the Company should, during office hours, permit any duly authorized person to inspect the map showing their lamps and gas-mains, and to take tracings of it.

Mr. LLOYD said the clause did not put any obligation on the Company to keep a map; and, therefore, although the Council might have power to take tracings, there might be nothing to take tracings of. He brought up an alternative clause directing that the Company should keep a map; that it should be open to the inspection of the Council's officers, with power to take copies and extracts; and that it should be corrected each year, so as to show alterations, if any.

Mr. WAUGH objected that this would be an alteration of the general law, and would put on the Company an obligation to which no other company were subject. He did not think, also, that the Company should be under obligation to keep the map correct, though no doubt they would do so.

Mr. LLOYD remarked that similar power had been given in the North Middlesex Gas Company's Act of 1895, and in many other cases.

The CHAIRMAN said the Committee considered the clause as drawn gave the Council sufficient power. The Company really placed themselves under obligation to keep a map; and the Council must assume that it was a correct map.

The Bill, as amended, was then ordered to be reported to the House.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Monday, May 13.

(*Before the* MASTER OF THE ROLLS *and Lord Justice* ROMER.)

White v. Bristol Gas Company—Liability for an Explosion.

This was an application by the defendants for judgment, or a new trial, on appeal from the verdict and judgment, dated Feb. 25 last, at the trial before Mr. Justice Day and a Special Jury at Bristol (*ante*, p. 627). The plaintiff, a licensed victualler, residing at the Ship Inn, Deanery Road, Bristol, brought his action to recover damages for injuries sustained through an explosion of gas on Nov. 25, 1899. In October and the beginning of November, the Bristol Tramways and Carriage Company dug a trench in the Deanery Road, in front of the inn, for the purpose of laying an electric cable, and plaintiff alleged that the Gas Company were negligent in the following respects—viz., (1) In not watching the work of the Tramway Company; (2) in permitting the trench to be dug too near the gas-main; (3) in not taking, or causing to be taken, any proper precautions against injury to the main; (4) in making no inspection of the main before it was covered in; (5) in making no examination or test of the main after it was covered in; and (6) in not discovering the leak. At the trial, the defendants alleged contributory negligence on the part of the plaintiff in taking, or allowing a man named George Baynton to take, a light into the place where the gas had accumulated. The Jury found for the plaintiff, and assessed the damages at £420. On behalf of the appellants, it was now contended that there was no evidence of negligence on their part; that the verdict was against the weight of evidence; that the Judge omitted to direct the Jury as to the issue, and as to the burden of proof; and that he wrongly directed the Jury to the effect that the facts in the case showed, or were *primâ facie* proof of, negligence on the part of the defendants.

Mr. DUKE, K.C., and Mr. WEATHERBY appeared for the appellants; Mr. FOOTE, K.C., and Mr. SALTER represented the respondent.

The MASTER OF THE ROLLS said it was the duty of the Gas Company from time to time, when they knew the ground in the neighbourhood of a main had been disturbed, to see whether there was an escape of gas. This had been decided by *Price v. The South Metropolitan Gas Company** and other cases.

Lord Justice ROMER said if the Gas Company had reason to suppose that the work of the Tramway Company would probably injure their main, or leave it in an insecure condition, and they took no steps to prevent mischief ensuing, they ought to be held liable for damage arising to the plaintiff by reason of that mischief. Otherwise, he could not see any obligation on the Gas Company to superintend what the Tramway Company were doing. There might be a question here for the Jury, whether the Gas Company had good reason to think that the work of the Tramway Company would injure the main. If they had, there was clearly evidence for the Jury that the Gas Company did not take proper steps to look after their mains when they were likely to be injured. He was not satisfied with the way in which this part of the case had been left to the Jury; and had the plaintiff's case depended upon this portion of the claim, he should have thought there must be a new trial. But there was another part which was properly left to the Jury, upon which they could rightly find that the Gas Company had been guilty of negligence, which caused the damage. This being so, he did not think any injustice had been done to the appellants by the want of proper direction in respect of the first point.

The appeal was dismissed, with costs.

Tuesday, May 14.

(*Before Lords Justices* COLLINS *and* STIRLING.)

Welsbach Incandescent Gas-Light Company, Limited, v. Vulcan Incandescent Light Syndicate.

This was an appeal from an order made by Mr. Justice Day, in Chambers, on the 26th of March, granting an injunction against the defendants, restraining them from infringing the Welsbach patent of 1893 until the trial of the action or further order.

Mr. NEILL appeared for the appellants; Mr. WALTER (Mr. MOULTON, K.C., with him) for the respondents.

Mr. NEILL urged at some length that there was a serious question as to the validity of the 1893 patent on various grounds, and that the certificate put in by the plaintiffs, of the validity of the patent, had been obtained in an action in which the defendant did not appear at the trial, and there was no cross-examination of plaintiffs' witnesses.

Mr. WALTER pointed out that the defendant Company, whose registered office is in Manchester, though having a nominal capital of £10,000, had only seven registered shareholders holding one £1 share each, and that an order had just been made in the Manchester County Court for its winding up.

The appeal was dismissed, with costs.

Subsidences at Tyldesley.—Owing to mining operations, further subsidences have lately taken place at the Tyldesley Gas-Works. The holder has gone down more than an inch, and there is considerable leakage of water from the tank. Notices have been issued warning the public not to leave lights burning during the night, so as to economize gas.

Louth Water Supply.—The ratepayers of Louth having decided against the proposed purchase of the water-works by the Corporation, the question of the supplementary supply obtained by the Water Company was referred to in the minutes of the Special Committee at the meeting of the Corporation last Tuesday, and they decided to protect their rights in the Welton springs.

* See "JOURNAL," Vol. LXV., p. 1385; Vol. LXVI., p. 982.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Friday, May 17.

(*Before Mr. Justice* WILLS, *without a Jury.*)

South Metropolitan Gas Company v. Mayor and Corporation of Bermondsey.

This was an action by the South Metropolitan Gas Company against the Borough Council of Bermondsey, and the claim was to recover the price of gas supplied to the Vestry for the baths and washhouses in the parish between June 24, 1894, and June 24, 1900.* They had limited the claim to six years; and as the defendants had pleaded the statute of limitations as to the first quarter, the sum of £28 would have to be deducted from the total claimed, which was £912 2s. 3d.

Mr. HORACE AVORY, K.C., and Mr. W. RYDE appeared for the Company; Mr. MACMORRAN, K.C., and Mr. PRITCHARD represented the defendants.

Mr. AVORY said that the case was a little curious, because it was admitted that during all this period the Commissioners of Baths and Washhouses, or the Vestry who succeeded them, had paid each quarter the amount demanded for gas. But ever since 1881, they had had a meter of their own, which turned out to be the most curious meter that was ever made.

Justice WILLS: It was a consumer's meter?

Mr. AVORY said it was a consumer's meter in this sense—that it took in and deceived the inspectors. He had a photo. of the meter. The top dial was only a test-dial, which did not record. In every ordinary meter, the right-hand dial reckoned hundreds; and a complete revolution of the right-hand dial represented 1000 cubic feet of gas. The next dial to the left was for 10,000 cubic feet, and the third for 100,000 feet. Now this meter had been read by all the gas inspectors as if it had been an ordinary meter; but it now turned out that the right-hand dial was for thousands, in the plural.

Justice WILLS: So they claim an excess of 90 per cent.?

Mr. AVORY said that was so. It seemed quite simple. But during all these years, as a fact, every one of the men who had gone to take the meter at the end of the quarter had recorded it in his book as if it was an ordinary meter; and the defendants had gone on paying a sum for gas which was ridiculously small, considering the quantity used.

Justice WILLS remarked that he only knew of one similar case. It was the case of a contract to make a railway in Sweden; and the estimate consisted of five figures in rix-dollars. The first man who totalled up the figures made an error of a million rix-dollars. These figures passed through the hands of some of the most eminent financiers in London, without the error being discovered till near the end of the contract.

Mr. AVORY said this went on for years; and the Vestry were paying £2 10s. and £2 16s. per quarter for the gas used in the baths and washhouses, which must have been a considerable quantity. It was immaterial for the purposes of the case whether the defendants knew the facts or not.

Mr. MACMORRAN: The meter was taken away and tested several times, because the Company suspected it.

Mr. AVORY said the Company had suspected it, and could not understand the extraordinarily small consumption, to which the superintendent replied that he had always had a great reputation for economy in the consumption of gas. He said he had enjoyed this reputation before he came to the baths; and he intended to keep it up. He (the learned Counsel) was now in a position to prove the mistake. Even when the meter was sent to the London County Council for official inspection, the inspector there made the same mistake when he first read it. Then at last they had a new meter put in, and this at once showed that the baths had been consuming ten times the gas that the Vestry had been paying for.

Mr. MACMORRAN: There was nothing the matter with the meter.

Mr. AVORY: No; it was the fault of its face. As a matter of fact, this had been going on since 1881; and the Company had lost something like £2989 worth of gas.

Justice WILLS: What is the defence?

Mr. MACMORRAN: That we cannot lawfully pay the money.

Justice WILLS: That is rather retrospective ground.

Mr. AVORY said if his learned friend meant that he could not make a rate for the purpose of paying the money, this was not a question which was raised now. All he asked was for judgment for the amount claimed. The manner in which the Company could recover it was another question altogether. They might move for a mandamus to compel the parish to make a rate. But it was for the defendants to settle how they should pay it, and this did not now arise. If the other side admitted the figures, he did not think there was any need to call witnesses.

Mr. MACMORRAN said he did not propose to question the figures; and, indeed, he had no means of doing so. The defendants were now aware that the mistake had been made; and if it had arisen with regard to themselves, there was no doubt but that they would have to put it right. The only question raised in the case was whether the defendants could lawfully pay the money. If they could do so, he did not suppose for a moment the Council sought seriously to contest their liability.

Justice WILLS said there was a difficulty in the matter, because, if there was judgment, unless the judgment was stayed, the plaintiffs might put in an execution.

Mr. MACMORRAN: Yes; and that would place us in a difficulty.

Mr. AVORY: Why should we not? I say that there are authorities to show that we are entitled to do so.

Justice WILLS: To put in an execution is not to make them levy a rate.

Mr. MACMORRAN said it had been decided that no one could touch money by a garnishee order in the hands of a treasurer; and just as they could not make a retrospective rate, so they could not take current moneys out of the hands of a treasurer to satisfy what they could not

* See "JOURNAL," Vol. LXXVI., pp. 753, 797, 1229; and *ante*, p. 104.

make a rate for. He submitted that it would be futile, in a case of this kind—where he would assume for the sake of argument that the rate could not be made—that either the money the proceeds of rates, or property also the proceeds of rates, could be seized or taken by execution. With regard to the money, that at least had been decided.

Justice WILLS remarked that there seemed to be a distinction between the two things—between property which could be taken in execution in the ordinary way, which was not essential to the business of the municipal borough, and property which was essential.

Mr. MACMORRAN said, if this meant anything, it meant that the plaintiffs would have the right to levy execution; and he argued that the Commissioners would have the right to elect to rebuy their property from the sheriff or to pay out the execution. If this was not the same thing, he could not see the difference.

Justice WILLS asked if there was any authority on the subject.

Mr. MACMORRAN replied there was none on this particular matter. The authority on the point of making a retrospective rate was well settled. In *The Earl of Jersey v. Uxbridge Rural Sanitary Authority*, Mr. Justice Vaughan Williams said: "It is not lawful to make a poor-rate for payment of a past debt. In my opinion, it follows that it is not lawful to levy execution on a poor-rate to satisfy debts, to satisfy which such a rate could not have been lawfully raised." He (the learned Counsel) would go further, and say that if authorities were precluded from making a rate to pay a debt they were equally precluded from paying out an execution of the same debt. It was absurd to contend that they must allow their property to be taken in execution, if they could not otherwise lawfully satisfy judgment.

Justice WILLS did not see that. There was a good deal of property which might belong to a parish, which was luxury, and which they could perfectly well do without. When they got to a fund properly put aside for special purposes, this could not be touched; but when they came to such things as furniture, &c., the business of Bermondsey would go on just the same without it. The only point would be that the Corporation might want to buy new furniture in place of that which was seized; and there was nothing to prevent them buying it.

Mr. MACMORRAN said he agreed with his Lordship, if they could produce property which was not the result of the rates If they could show that the Local Authority had property which had not been bought out of the rates, then he should think there would be no doubt about the proposition. A municipal corporation might have land which had not been bought with the rates; but this was a very different thing to the property which the rates had provided. The debt was one of the Commissioners of Baths and Washhouses for the parish of Rotherhithe, and was not one of the debts of the Borough Council at all; and to give judgment against them without qualification, would be to order them to pay that for which they could not make a rate.

Justice WILLS said if the liability was transferred to the borough by statute, it did not matter from whom it was transferred.

Mr. AVORY pointed out that the objection of his learned friend was not taken on the pleadings. They had not pleaded non-liability.

Mr. MACMORRAN said he should be willing to have judgment given in the matter, and then for the matter to be argued out on the question as to what properties were to be seized. He saw no reason why an entirely different set of ratepayers to those who had used the gas should have to pay the money. He was not suggesting any wrong had been done. It seemed to have been a mistake made all round. If the matter could not be raised now, he argued that the judgment ought to be stayed in order that the direction of a Court should be taken as to the manner in which the judgment should be enforced.

Justice WILLS said he must give judgment; but if the parties treated the case as if it was a summons, and stayed execution that he might put the matter in train to be argued, he would agree to that. He should not stay execution on his own motion.

Mr. AVORY thought his Lordship should not be troubled further. It was not to be supposed that the Company would put the judgment in force in an illegal manner; and they would be responsible for selecting an appropriate mode. The most inconvenient course would be to take execution, and raise the liability by trespass. The doctrine of the retrospective rates was not universally applicable to all rates; and there was no general proposition of law that a retrospective rate could not be made. It depended on the statute; and the statute under which the rates in question were made said: "For defraying the expenses which shall have been or shall be incurred in carrying this Act into execution in the parish, the Vestry may, and shall, from time to time order the Overseers to levy that, and as part of the rate for the relief of the poor, such sums as the Vestry shall deem necessary." He said this was a direct statutory authority for levying a rate, and for defraying expenses which had been incurred.

Mr. MACMORRAN said he was prepared to contend that the Act gave no power to make a retrospective rate which would be illegal. It was not a matter on which his Lordship could give judgment without trying the question of whether the judgment could be properly satisfied in any way. His submission was that it could not be so satisfied. During the whole of the period in which the gas had been used, the defendants had paid the money due—the plaintiffs had been duly paid and satisfied; and there was no suggestion of any fraud, concealment, or anything of that kind. Defendants therefore submitted that, under these circumstances, the accounts for money due had been fully satisfied, and that the Court could not open up accounts which had been settled quarter by quarter.

Justice WILLS: If money has been paid under a mistake as to the facts, it can be recovered; and the same principle applies if too little has been paid.

Mr. MACMORRAN said he could not carry his argument further. All he could say was that this was not a case where judgment should be given against the defendants generally. The action had been transferred to them as representing a particular parish; and the question was where the money was to come from.

Mr. AVORY pointed out that, under section 4 of the London Government Act of 1899, Rotherhithe was included in Bermondsey borough for all these purposes.

Mr. MACMORRAN said it was a transfer to the Borough or Council comprising the area; and this was one of the parishes comprised in the borough of Bermondsey.

Mr. AVORY remarked that they were suing for the part which belonged to Rotherhithe only.

Justice WILLS said the Act stated that these separate areas should cease to exist. He supposed this was the right way of doing it; and that their liabilities should be transferred to the larger area within which the small one had existed previously.

Mr. MACMORRAN submitted that this was not the meaning of the statute for the present purpose. The Borough Council simply became the successors of these smaller bodies; and the transference would be that of these small bodies, and no others. This was a liability which would be transferred to the Borough Council, but not in the sense that the funds of the Vestry would be liable. This money would have to come out of the whole of the transferred area.

Mr. AVORY did not assent to that.

Mr. MACMORRAN said it was only another reason why he submitted that judgment should not be given simply and generally against the Borough Council for what was not their liability, but only a liability of one-third of the assessment. He asked his Lordship in any case to grant a stay of execution, in order that matters might be settled between the parties.

Justice WILLS asked how they proposed to settle it. Stay of execution would not do so.

Mr. MACMORRAN said it would come to the same thing.

Justice WILLS could not see what would be the good of staying execution, as it would leave matters just as they were. In his opinion, it was clear that there must be judgment for the plaintiffs; and it was also clear that he ought not to interfere with the execution to which the plaintiffs were entitled. There would be judgment for the plaintiffs for the amount claimed, £884 2s. 3d., and costs.

South Metropolitan Gas Company Fined.

At the Southwark Police Court, last Tuesday, before Mr. Paul Taylor, the South Metropolitan Gas Company were summoned, at the instance of the London County Council, for supplying gas at the Stoney Lane, Tooley Street, testing-place, of less illuminating power than is required by Act of Parliament. Mr. Godfrey, who appeared in support of the summons, explained that a test of the gas revealed the fact that it was of 15·49-candle power only—just half-a-candle short of the statutory requirements. The Company gave notice of appeal to the Chief Gas Examiner (Dr. A. W. Williamson), but never proceeded with it. Mr. Pasmore, who appeared on behalf of the Company, said the result of the test was curious in this respect, that at other stations, of which there were five, the gas examined at the same time was well over the limit. He could only point out to the Court that since the Company was previously there some 4000 tests had been made, and this was the only occasion upon which the gas had been found to fall below the statutory limit. His Worship asked whether the inferiority arose from bad coals. Mr. Pasmore said it could not be that. It might be due to sudden change in the atmospheric conditions, but it certainly was not because the Company used inferior coal. Mr. Godfrey said that if there was any unavoidable cause, the Chief Gas Examiner had power to take it into consideration; but as a fact, the Company declined to go before him. His Worship imposed a fine of 40s. and 2s. costs.

A Heavy Penalty for Stealing Gas.

At the Liverpool City Police Court last Wednesday week, G. J. Saunders was summoned by the Liverpool United Gaslight Company for illegalities in the use of the gas supplied by the Company to his premises. Mr. Maxwell prosecuted on behalf of the Company, and said they had reason to believe the fraud practised upon them by the defendant had been going on for a considerable time. In consequence of the amount of the defendant's gas bills being small, one of the meter inspectors called on March 20, and then found that the union connecting the pipe with the meter had been unscrewed a foot or two from the meter, and that the gas was escaping. The inspector screwed it up, and paid another visit on the following day, when he put a private mark on the union. On March 25 he went again, and found that the union had been removed, and that the gas was escaping again. He reported the matter, and it was arranged that the inspector and a superintendent should pay a surprise visit on Easter Saturday at eight o'clock at night. There was a trapdoor which led down into the basement, where the meter was. The defendant declined to let the officers inspect the meter, stating that he sublet the cellar to a man who had the key of the trapdoor. The officers asked that the man should be sent for. The defendant's daughter went away for the purpose, but, needless to say, could not find the sub-tenant. The officers meanwhile searched the premises, and found another trapdoor at the back, which was not locked, and which admitted to the same cellar. The inspector lifted up the trapdoor; and all the shop lights immediately went out. Going down below, the officer saw a figure disappearing from a bench by the meter; but by the light of a match, he found the defendant's son underneath the bench. The officer examined the meter, and found that the union was disconnected some inches from the latter, and that 10 feet of india-rubber piping, smelling very strongly of gas, was on the floor. The piping had been used to connect the main gas-pipe with defendant's brazing hearth, independently of the meter, for brazing purposes, and had also been used for connecting a pipe which carried the gas into the shop. In this way the gas had never passed through the meter at all. The summonses were laid under four sections—the first under the Gas-Works Clauses Act, 1847, for laying a pipe to another pipe belonging to the Company without their permission, and the three others under the Act of 1871, for disconnecting a pipe and for fraudulently abstracting and using gas. Evidence corroborating Counsel's statement was given. The Deputy Stipendiary thought that all the cases had amply justified the action taken by the Company, and that they had been proved as fully as it was possible for a case to be proved. For fraudulently abstracting gas, he imposed a fine of £5 and 5s. 6d. costs; for consuming gas so abstracted, 1s. fine, and 5s. 6d. costs; for laying a pipe, £5 and 5s. 6d. costs; and for disconnecting a pipe 1s., and 5s. 6d. costs. On the application of Mr. Maxwell, £2 2s. extra costs were allowed.

MISCELLANEOUS NEWS.

THE LONDON COUNTY COUNCIL AND WATER GAS.

At the Meeting of the London County Council to-day, the Public Control Committee will present a report on the subject of the supply of water gas in the Metropolis. After stating that the Housing of the Working Classes Committee had called their attention to the facts in connection with the death of Mrs. Sharp and two children at No. 28, Culham Buildings, Boundary Street, on the 22nd of February last (*ante*, pp. 640, 702), the Committee refer to the appointment of the Departmental Committee to inquire into the question of the supply of water gas, and then go on to say: "On the 17th of January, 1899, the Committee reported to the Home Secretary the results of their inquiry, and made a series of recommendations with regard to the subject; suggesting (*inter alia*) that the proportion of carbonic oxide in the public gas supply at night should be limited to 12 per cent., and that provision should be made for testing the gas for carbonic oxide. The matter is of the utmost importance, as it is known that as small a quantity as 0·4 per cent. of carbonic oxide present in the air of a room has been fatal to the persons breathing it. Carburetted water gas can contain as much as 40 per cent. of carbonic oxide, while ordinary coal gas usually contains only from 5 to 6 per cent. So that the danger to life where a leakage occurs increases proportionately to the amount of carburetted water gas mixed with the coal gas. We are not aware that any action has been taken on the recommendations of the Committee, and we have therefore addressed a letter to the Home Office asking whether any steps have been taken, or are in contemplation, in the matter. In the meantime, we propose that the Chemist should make a series of tests, to ascertain the amount of water gas which is added to the gas supplied in the county by the principal Gas Companies. This will entail an expenditure estimated at £4 per week. There is sufficient provision in the estimates for the purpose; and we recommend—'That the Public Control Committee be authorized to arrange for a series of tests of the gas supplied by the three principal Gas Companies for a period of six months, at a cost not exceeding £4 per week, with a view to ascertaining in what proportion water gas has been added to the ordinary gas.'"

BIRMINGHAM GAS, WATER, AND ELECTRICITY WORKS.

Annual Report.

The Gas, Water, and Electric Lighting Committees of the Birmingham City Council have prepared their annual reports for submission to the Council at a special meeting to-day.

In their report, the Gas Committee refer to the fatal accidents at the Windsor Street works, and with regard to the fatality that befel Mr. F. S. Green, the general foreman of the works, while superintending the trial of a capstan recently, they mention the recommendation of the Factory Inspector as to the provision of means for instantaneously stopping capstans, and state that the possibility of devising a way to meet the suggestion is receiving their most careful consideration. Reference is made to Mr. Edwin Smith's resignation, and to the high appreciation of his services expressed by the Committee. The continued successful working of the branch collecting offices in outlying districts is also reported upon; and it is shown that at the February collection in 1900 12,057 accounts were received amounting to £12,799, and in February, 1901, 14,160 accounts amounting to £16,569. Owing to a reduction in the demand for coke and breeze consequent upon the general trade depression, the Committee have reduced the price of both coke and breeze by 2s. 6d. per ton from April 1 last. The accounts for the year ended March 31 last show that the credit balance on the profit and loss account amounts to £553. In July last, the Committee reported that the estimates then submitted, based upon an increased charge for the last two quarters of the financial year of 3d. per 1000 cubic feet of gas consumed, would not provide any contribution to the improvement rate. They now remind the Council that they have already contributed the sum of £29,821 from the previous year's profits towards the improvement rate of 1900-1, and, to an inquiry from the Finance Committee of the Council, the Committee have replied that they hope to contribute £30,000 to the improvement rate of 1901-2 from the profits of the department. In this connection, it must, however, be borne in mind that the condition of the coal market may materially affect the trading result of the department in the current year. The Committee recommend that the £553 balance at the credit of the profit and loss account shall be appropriated to the improvement rate, and, if this is approved, the contribution for public purposes from the gas undertaking, for the year under review, will be as follows: In aid of improvement rate, £553; in aid of improvement rate (interest on reserve fund), £4000; in aid of public lighting within the city, £11,022; in aid of the public lighting of courts in the city, £2749; in aid of public and court lighting outside the city, £3966—making a total of £22,291. During the year ended March 31, 9486 meters were repaired at a cost of £6379. The following is a comparative statement for the years ended March 31, 1900 and 1901:—

	1901.	1900.	Inc.	Dec.
Sale of gas (cubic feet in thousands)	5,709,610	5,597,471	112,138 or 2 per ct.	—
New services	5,444	5,228	216	—
Gas-fires fixed	104	86	18	—
Cooking and heating stoves hired	3,114	2,049	1,065	—
Cooking and heating stoves sold	865	941	—	76
Tons of coke in stock at March 31	10,342	1,467	8,875	—
Total number of prepayment meters fixed at March 31	13,080	9,875	3,205	—

The Water Committee report that the water-rents for the year ended March 31 last show a total increase of £9979, being 4·32 per cent., against 5·14 per cent. increase in the previous year. The whole of the additional revenue has been absorbed in increased working expenses. The profit and loss account shows an adverse balance of £32,737, which has been written off to special water fund, in accordance with the Act of 1892. This result is due to the charges for interest on capital expenditure under the Act of 1892, which, after deducting bank interest, amounted for the year to £91,166. After writing off the balance of the profit and loss account, the special water fund shows a credit of £96,250. Mr. William Gray was appointed to his present position of sole Distribution Engineer in October, 1896, at a salary of £300. Mr. Gray is the principal Engineer permanently stationed in Birmingham; and the Committee, recognizing the value of his services, recommend that his salary should be increased to £400 per annum from the beginning of the present financial year. The Committee report an arrangement with the East Worcestershire Water Company under which the surplus yield of a new well which has been sunk by that Company at Catshill, near Bromsgrove, and which is estimated at about 500,000 gallons a day, will be available for the use of the department in the course of the present summer. Acting on the opinion of Professor Lapworth that the yield of the Longbridge well should somewhat exceed the quantity of water obtained from it, the Committee have, under the advice of Mr. Davey, undertaken the driving of headings, with a view to securing a larger quantity of the underground water. These operations have met with some success; an additional yield of about 200,000 gallons per day having been secured. In the course of the operations, however, a serious breaking-in of sand has been encountered, which has had the effect of stopping pumping entirely for the time being. The work of removing the sand and dealing with the in-break is now proceeding; and it is hoped that the well, supplemented in yield as indicated above, will be again available for supply in a few weeks' time. The Committee also report the continued progress of the works in connection with the Welsh supply. The amount expended on the works in the Elan Valley during the year was £181,859; giving a total of £1,007,019 up to the present time. The capital expenditure in respect of the Elan supply is now £3,456,921.

The Electricity Supply Committee state that the number of units sold during the year ending March was 3,040,822, which compared with 2,357,506 in the previous year; the money value being £55,810 and £45,247 respectively. This is an increase of 28·9 per cent. in the units of electricity sold, and 23·3 per cent. in money value. The revenue account shows a gross profit for the year of £15,353, but had only the usual charges in connection with the generation of electricity and maintenance been debited against it, there would have remained a balance of £27,233 wherewith to meet the interest and sinking fund charges, which amount to £21,838. The exceptional charge against revenue is the cost of altering and improving a portion of the feeder mains and of changing over sections of the department's system from 110 to 220 volts. The first complete year of the working of the system by the department may be considered satisfactory. The lamp and motor additions during the past year on the various circuits, reduced to a 16-candle power factor, amounted to 11,855, bringing the total number of lamps to the end of the financial year to 78,293, being an increase of 17·8 per cent. The total number of motors connected is 260, equal to about 710-horse power.

THE MOND GAS BILL OPPOSITION.

The preamble of the Mond Gas Bill having been proved, consultations were (says a Birmingham contemporary) pretty frequent on Tuesday among the representatives of the Local Authorities in the Black Country and those who have been responsible for the opposition before the House of Commons Committee. In some quarters there is a feeling of indignation that the local authorities should have been practically compelled to expend such a large sum of money in parliamentary opposition; for it is felt that, if the promoters of the Bill had met them in anything like a friendly and conciliatory spirit, this money might have been saved, or at any rate a large portion of it. The promoters, however, have treated the opposition with scant courtesy, never once having offered to negotiate for terms; and every concession has had to be forced from them, either by the members of the Parliamentary Committee or the Counsel who appeared to oppose the Bill. Several large manufacturers in the Black Country who are not connected with any of the Town or District Councils who have been opposing, have given it as their unbiassed opinion that the promoters have failed to prove they can distribute Mond gas economically, and that the difficulties in the way of taking enormous mains over the highways already covered with gas and water mains, to say nothing of the electric and telephonic conduits, are too great to be overcome. It is generally admitted that small plants placed inside large works may be laid down with advantage; but among practical men a scheme like that proposed for conveying the gas in such enormous quantities over large areas is altogether out of the question. The Local Authorities feel that their opposition was justified by the Committee fixing a period within which the undertaking must be commenced, and also a limit to their exclusive rights to manufacture the gas. There is a unanimous feeling among them that opposition must be carried to the House of Lords, whatever further cost it may entail, and that the clauses of the Bill must be fought line by line, supposing the Lords' Committee approve of the general principle of the Bill. It is said that the cost incurred by each Local Authority represented by Counsel in opposing the Bill has been about £70 per day, which means over £700 to each of them already. It may not cost the same amount to oppose before the Lords' Committee; but if the promoters adopt the same uncompromising attitude as in the past, there is no telling what the total may reach. The favourable impression which many public men at first entertained of the proposal has been entirely removed by the high-handed policy the promoters have adopted, and the attempt they have made totally to disregard the rights and privileges of the Local Authorities, for which some of them have had to pay dearly in the past in promoting Parliamentary Bills of their own; and they now feel there is no other alternative but to fight this Mond Gas Bill to the bitter end.

THE FATALITY AT THE BRIGHOUSE GAS-WORKS.

Adjourned Inquest and Verdict.

The inquiry into the circumstances attending the deaths of William T. Owen and Robinson Barraclough, as the result of an explosion at the Brighouse Gas-Works on the 12th ult. (*ante*, pp. 1019, 1074), was concluded on Wednesday, the 8th inst., before Mr. P. P. MAITLAND, the West Riding Coroner.

Mr. J. PARKINSON, Town Clerk and Consulting Gas Engineer to the Brighouse Corporation, represented them; Mr. W. WRIGHT and Mr. W. F. W. RHODES appeared for the relatives of the deceased; and Mr. K. H. GARVIE, Government Inspector of Factories for the Halifax district, was in attendance.

Sarah Barraclough, the first witness, deposed that on the day of the accident her husband told her, on going to work after dinner, that they were starting on a fresh job in the afternoon, and he did not much like it; but he did not give any reason. He said something about tar-valves, and remarked that some of them would be burnt to death before they were done. She had a subsequent conversation with her husband at the Huddersfield Infirmary, and he then told her that the accident would not have occurred but for Owen.

Alfred Bruzaud, House Surgeon at the Infirmary, described the injuries sustained by the deceased. He said the case of Owen was hopeless from the first; but Barraclough's condition was far less serious. He improved under treatment, but later on, after an operation, he showed signs of collapse, and died on the 18th of April from exhaustion and shock.

James Thornton, who was also injured, said he was employed as a yard labourer at the Brighouse Gas-Works at the time of the accident. Previously he had been a stoker there. At half-past one on the afternoon of the 12th of April, he went to work with Barraclough, and Owen was there. Before dinner Owen told them they were going to take off a flange because the tar-valve was stopped up. Nothing was said about gas-making being stopped while they cleared out the tar. After dinner, Owen started to remove the flange. He procured a key and loosened the four set-screws; and then tar started running out. Owen began to pull the flange off by degrees; but it did not come right off till the tar suddenly blazed up. He (witness) was burnt about the face and both hands. All the works were in operation while the flange was being taken off. As a practical man, he did not think it was safe, but dangerous, to take off the flange. That was his opinion before Owen removed it, and he told him so; but Owen never spoke.

By the CORONER: The making up of the valve had been in progress for some time; and it would have gone on all right if Owen had left it alone.

By Mr. PARKINSON: He warned Owen twice about taking off the flange. The tar ran thin from the first; and from this he considered the valve was all right, and he told Owen to put the flange on again.

By Mr. WRIGHT: Between half-past one and two o'clock—that was just before the accident—he told Midgley Crowther that it would be dangerous to take the flange off, and that there would be an accident before they had done; and Crowther said there would.

Midgley Crowther deposed that about five minutes before the accident he saw Thornton going to the retort-house, and asked him what they were doing. He said they were going to take a flange off above the flush-valve of the retort. Witness said he should not like to take it off; it was a dangerous place. Thornton replied, "We shall have it to do, I suppose."

By the FOREMAN: He said it was dangerous because it was so close to the foul mains, and there was tar near. When tar came through, Owen ought to have fastened the flange up, because it showed that the valve was free. Before taking the flange off, if he thought the valve was made up, he should have shut it off.

Percy Saunders, foreman stoker at the works, said he was in the retort-house in the morning of the third day after Owen's arrival; and Owen told him he thought the tar-valve under the flange was stopped up. The stoppage was not relieved, but went on. Owen spoke about it several times, and said it was not working as it should do; but he did not give him (witness) to understand that it was getting worse. The working operations ought to have ceased to relieve the stoppage; and they could have lighted other retorts.

Mr. *W. L. Sutcliffe*, Manager of the works, said that about the Wednesday before the accident Owen complained to him about the valve being made up, and wanted to take the plug out of it. Witness told him that he must on no account touch it. He did not examine it himself because he thought Owen was a competent man, and understood his work. On the morning of the accident, Owen seemed anxious to have the valve loosened; and witness told him to get a piece of wire and put it down the dip-pipe in order to relieve it. Owen did not say anything, but appeared to understand what witness said. Afterwards witness asked Owen if he had got it loose; and he said he had not.

The INSPECTOR: Did you tell him not to touch the valve?

Witness: I told him not to touch it on any account. At the same time I told him I was going to put the retorts out of action, which would take about a couple of hours.

A JUROR: Why did you not make a complete investigation of the complaint of the servant under you, and see that there was no obstruction? Why did you not go and satisfy yourself that this man's complaint was not correct?

The CORONER: He said he considered Owen a competent person, and he left it to him.

Witness said if he had a competent man, he supposed he could answer for himself.

By Mr. WRIGHT: Before the accident, he thought Owen understood his work, for whenever he gave him instructions he took them in silence. They had had no notice posted about the premises instructing the men as to the manner in which they should do their duty, &c. He could not deny, however, that such notices were posted at Leeds, Huddersfield, and other places.

This concluded the evidence.

The CORONER, in summing up, said the first question the Jury had to consider was whether due precaution had been taken by the employers. He thought their answer would be in the affirmative. Another question they had to consider was whether there had been due precaution on the part of the workmen on the job. On that matter he thought the answer would be in the negative. Owen, the foreman employed, who was supposed to be thoroughly competent, had proceeded to do something which seemed to him (the Coroner) almost in the nature of an insane act, which resulted, unfortunately, in the death of himself and the man Barraclough. A third point was: Was the want of precaution accidental, inadvertent, or criminal, and, if criminal, who was to blame? They had heard Thornton's evidence; and although he was unfortunately injured, and unable to tell them all the circumstances of the case, he had told them that Owen loosened the flange, and appeared to pull forcibly at it, and almost immediately there was an explosion.

The Jury retired to consider their decision. After five minutes' absence, they returned a verdict to the effect that the deaths were caused accidentally. They recommended that notices for the guidance of the men in their duties should in future be posted in the works.

THE FATAL FIRE AT THE WANDSWORTH GAS-WORKS.

Adjourned Inquest and Verdict.

On Monday last week, Mr. Braxton Hicks resumed the inquiry, opened on the 6th ult., into the circumstances attending the death of Robert Fisher, which resulted from the fire in the sulphate-house at the works of the Wandsworth and Putney Gas Company on the 1st ult., as already recorded in the "JOURNAL" (*ante*, pp. 906, 952, 1019). The foreman in the sulphate-house (George French) deposed to noticing tar spurting from one of the gauges of the boiler. The tar became ignited, and ran into the sulphate-house adjoining, and set it on fire. He called out to Fisher to get away from the place; but he did not know how he could have done it. Thomas Godwin, the general foreman, said he saw blue flame and white smoke issuing from the bottom of the condensers, whence he thought the first noise proceeded. Mr. H. H. Jones, the Company's Engineer and Manager, expressed the opinion that the fire had been caused by the tar issuing from the broken gauge of the boiler, which was an old one, being ignited at the furnace used for burning the waste gases. He could not accept the theory put forward that there had been an explosion in the condensers, and French had not stated that there was one. The flash-point of the tar was between 120° and 140° Fahr. He had never anticipated that there would be any danger from water-gas tar. The Coroner having summed up, the Jury returned a verdict to the effect that deceased met his death by suffocation, the result of an accident caused by the firing of tar escaping from a broken gauge on the boiler; but they were unable to assign any cause for the breakage.

HEYWOOD CORPORATION GAS SUPPLY.

The Manager's Report.

The Manager of the Gas Department of the Heywood Corporation (Mr. W. Whatmough) has presented to the Gas Committee his report for the year ending the 31st of March. It is dated the 13th inst., and contains some particulars beyond those given in the "JOURNAL" last week (p. 1338). There was an additional expenditure of £323 on capital account—£97 for mains and services, and £226 for prepayment meters. The capital amounts to £84,223, or at the rate of 14s. 8·18d. per 1000 cubic feet of gas sold. The gross revenue for the past year was £21,406, and the gross expenditure (less interest and sinking fund) £15,599; leaving a gross profit of £5807, or a decrease of only £665 compared with the previous year. The net profit is £865, or £901 less, due to the higher price of coal. The receipts for gas sold for all purposes came to £16,024, compared with £15,982 for the year 1899-1900. During the past year, 2830 tons of cannel and 9391 tons of coal were carbonized, or a total of 12,221 tons, against 12,451 tons for the previous year, or a decrease of 230 tons. The gas made per ton of coal was 10,312 cubic feet, against 10,097 cubic feet, or an increase of 215 cubic feet per ton. The total quantity of gas manufactured was 126,028,000 cubic feet; being a rise of 304,000 cubic feet, or 0·24 per cent. The gas sold amounted to 114,726,872 cubic feet—an increase of 41,855 cubic feet only. The gas consumed by prepayment meters again showed a considerable advance; the total amount collected being £412. The quantity of gas not accounted for was 9,851,428 cubic feet; representing a leakage of 7·83 per cent., compared with 8·13 per cent. before, or a decrease of 0·30 per cent. The maximum quantity of gas delivered in 24 hours was on the 12th of January, when it was 849,000 cubic feet, as compared with 922,000 cubic feet in the preceding year; showing a decrease of 73,000 cubic feet. The minimum was on the 11th of June—103,000 cubic feet, against 88,000 cubic feet, or 15,000 cubic feet more. Mr. Whatmough says the demand for stoves and grillers continues to extend; the total number in use being 2870, or an increase of 366 for the year. The number of gas smoothing-irons in use is now 858, against 368 for 1899-1900, or 490 more. He expresses regret that the consumption only shows a slight increase; but this no doubt was due to the mild winter, and short time in the cotton trade. The increased charge for coal (£1750 as compared with the preceding year, and £2740 more than in 1898-9) was a severe tax on the department. Taking this into account, and considering that the price of gas was not increased to meet the extra cost, he believes the Committee will consider the result of the year's working satisfactory.

Runcorn Water-Works Extensions.—Last Thursday week, Mr. H. Percy Boulnois, an Inspector of the Local Government Board, held an inquiry at Runcorn with respect to an application of the District Council for sanction to borrow £2300 for an extension of the water-works. Mr. F. A. Lake, the Law Clerk, explained that the present debt on the works was £71,000. Evidence was given that the money was required to improve the pumping-station and to erect a water-tower for the purpose of increasing the supply to the neighbouring township of Weston, which is on an eminence. At present the supply is intermittent.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

The Annual Meeting of this Company was held last Thursday, at the London Offices, No. 1, East India Avenue, E.C.—Mr. F. J. HESELTINE in the chair.

The CHAIRMAN, before proceeding with the business, said it was his painful duty to bring to the notice of the shareholders the death of Mr. E. W. Layton, who held the appointment of Secretary from the date of the formation of the Company in 1875. He passed away in November last, after a long and painful illness, deeply regretted by the Directors, staff, and a large circle of friends and acquaintances. By Mr. Layton's death, the Company were deprived of the services of a loyal and courteous officer, while he (the Chairman) had to deplore the loss of a sincere friend. In his place the Board had appointed Mr. J. M. Macmorran.

The SECRETARY having read the notice convening the meeting,

The CHAIRMAN, explaining a little delay in holding the meeting, said the reasons were that the Board desired to supply the shareholders with the latest information as to the satisfactory progress of the business during the current year, and more particularly they desired that sufficient time should elapse to admit of an estimate being formed of the advantages gained by the installation of inclined retorts and other improvements carried out at the works, but which only came into operation near the end of the past year. When he last addressed the shareholders, he stated that the Directors had entered into a contract with Messrs. Dempster, of Manchester, for the erection of inclined retorts and a retort-house, which it was expected and hoped would be ready in June—the commencement of the Argentine winter. But in this the Board were disappointed, for it was not until July that four sets only were experimentally lighted. The Company had therefore no advantage from the installation until the winter had almost passed. They had, however, now had time to judge of the benefit derived from their working, which had been very marked; for by their use they had not only greatly reduced the number of hands employed, but they had also secured much better carbonizing results. Although practically no cannel was now used, the yield of gas had been much increased. At the last meeting, he also told the shareholders how keen was the competition between the Companies supplying the city, and that the Board and their representatives had for a long time endeavoured to prove the folly and reckless waste of money by the Companies in pursuing this suicidal policy, and the advantages they would all derive by coming to an arrangement by which this injurious competition should be abandoned. He need scarcely say with what satisfaction the Directors reported that an agreement was signed by the Managers of the three Companies in May last whereby this competition was practically abandoned. Since then the Managers had had monthly meetings, at which many improvements had been added to the *convenio;* the advantages already obtained by each Company being so marked that the Directors had every hope of it becoming permanent. Another satisfactory step in this direction was that an effort was being made to bring about an arrangement with the Electric Companies for mutual protection against fraudulent and bad-paying consumers. Two matters had specially occupied the attention of the Board and management in Buenos Ayres since the last meeting—viz., the introduction of cooking and heating stoves and the improvement of the public lighting by the use of the latest and best type of European incandescent burners. In both directions, they had met with considerable success; and everything pointed to a larger demand during the next year or two. Specially referring to incandescent burners, he said that the Directors had, within the last few days, been advised by their Committee that the Municipality had signed a seven years' contract with them for the supply of a large number of lamps, all of which were to be fitted with these burners. The number of public lamps was increased during the year by 578; bringing the total up to 6994, the accounts for which were regularly met—in fact, the Company's relations with the Municipality were, he was pleased to say, on the most friendly footing. The year was marked by difficulties similar to those that had faced gas companies both at home and abroad. In their own case, trouble with the miners so restricted delivery of the coal contracted for, that the Directors were unable to take advantage of the very low rates of freight they had arranged. This, and somewhat exceptional local causes, contributed to add to the expenses—such, for instance, as the heavy outlay on removal of mains and services (which amounted to above £3000), owing to the large area of new paving carried out by the authorities in the Company's district during the last two years. Happily, the more favourable price received for gas in consequence of the gold premium remaining about 127, added to what was gained by the economy in production and by the abolition of the "propaganda," enabled the Directors to meet these exceptional expenses. Since the report was circulated, the Directors had received from their representatives a cable to the effect that, during the past four months, there had been a marked decrease in the expenditure and a very considerable increase in the revenue as compared with the corresponding period of last year. In November last (it being the Argentine summer), the opportunity occurred for repairing the Company's oldest holder; and a contract for this purpose was made with Messrs. S. Cutler and Sons. The holder was taken over by the Company when the works were purchased, and had been in constant use since. While on the subject of repairs, he explained that, in dealing with sums expended on portions of the new plant, on improvements, and on depreciation (in addition to the amount spent annually on the upkeep of the works), the Directors considered the soundest and wisest policy was to rest content with the dividend of 6 per cent. (the average for the last twenty years or so), and to gradually build up the reserve free from any claims. To this end, they had written off revenue during the last few years the sum of £55,585, which embraced the cost of oil and water gas plant, alterations and improvements to works, cost of initiating the cooking and heating department, expenses of debenture issue, and depreciation. In addition to this, they had, as would be seen, a reserve fund of £40,000, which was entirely free, and a special contingency fund of £11,321. He felt this condition of things should be understood and not lost sight of when estimating the value of the property; and he was confident that, after hearing this statement, the shareholders would say the Directors were justified in not writing off any further depreciation during 1900. They would probably have heard that, at the end of last year, an attempt was made by certain parties to bring about an amalgamation of the three Gas Companies in Buenos Ayres; but in consequence of the wide difference in the price at which the shares of the respective Companies was calculated, the project fell through. While the Board would probably not oppose amalgamation (if approved by the shareholders), it must be on equitable terms. Having mentioned that during the year the Company had gained 495 consumers, the Chairman referred to a visit that one of his colleagues (Mr. F. C. im Thurn) paid to Buenos Ayres in December last. He thoroughly inspected the Company's property, devoting some two months to the work, and initiated such changes in the local management as, the Directors had every reason to believe, would be of advantage. He brought back a most satisfactory report as to the admirable condition of the works, the excellence of the staff, and their zeal in the Company's interest. Turning to the accounts, the Chairman said the shareholders would notice on the debtor side that the capital account remained the same—£500,000 share capital and £220,000 debenture stock; leaving £30,000 of the latter still unissued. The reserve fund amounted to £40,000, but £11,321 had been placed to a special contingency fund in respect to services which had been re-valued by their Manager. On the credit side, the property account had been increased by £20,116, made up by the cost of land purchased near the works (required in connection with the oil-gas process), the expenditure on extensions of mains, and the sum spent on building the new inclined retorts and retort-house. Service-pipes for public and private lighting had had £17,694 added, of which £6373 was expended in 1900 and £11,321 was due to the re-valuation by their Manager. In the course of references to other matters, he mentioned that in regard to coal, prior to the imposition of the 1s. per ton export tax, the Directors had contracted for the bulk of the coal for the present year at a great reduction in price over that ruling in 1900. They had also secured freight for same at a reasonable rate. Respecting the South Barracas Gas Company's works (which are leased to this Company), the Chairman said the account had been reduced by the issue to this Company of £24,400 of 4 per cent. debenture stock on account of advances made on the South Barracas Lomas extension. These works were in first-class order, and were making a profit over and above the dividend guaranteed by this Company and the interest on their debenture stock. On the debtor side of the balance-sheet, an item of £35,775 appeared as due to sundry creditors. A large part of this, the Chairman explained, represented temporary loans incurred in connection with the construction and equipment of new works, in addition to those to which he had alluded as having been written off revenue account. The Directors thought the time had arrived when this floating debt should be extinguished; and so they had resolved to offer for subscription the £30,000 balance of the £250,000 debenture stock created in 1897. They had fixed the price at 95; and the stock would bear interest at the rate of 4 per cent. The net revenue showed a profit of £41,645, to which had to be added £3224 brought forward from last year. After payment of the fixed charges, the balance of the cost of the water-gas plant, and a proportion (as agreed) of the expenses of discount on the issue of debenture stock, £32,232 remained to be dealt with. From this, £10,000 had already been paid to the shareholders as an interim dividend; and the Directors recommended a final dividend of 8s. per share, making 6 per cent. for the year, and leaving £2232 to be carried forward. In conclusion, the Chairman moved the adoption of the report and balance-sheet and the declaration of a dividend at the rate of 6 per cent. (free of income-tax), 2 per cent. of which has already been paid.

Mr. ROSS PINSENT seconded the motion, which, after a few congratulatory remarks by Mr. SAMUEL SPENCER, and further explanations by the CHAIRMAN, was unanimously adopted.

Resolutions were also passed re-electing the retiring Directors (Mr. F. J. Heseltine and Mr. Ross Pinsent) and the Auditors.

A vote of thanks was next accorded to the Local Committee, the Managers, and the staff in London and Buenos Ayres.

Similar acknowledgment was made of the services of the Chairman and Directors; and, in submitting the proposition, Mr. SPENCER asked the Chairman to convey to the late Chairman (Sir Wilford Brett) the best wishes of the shareholders for improved health.

SOUTHPORT CORPORATION GAS SUPPLY.

Profits and Incandescent Lighting.

At the Meeting of the Southport Town Council last Tuesday, Mr. Trounson moved the adoption of the minutes of the Gas Committee. He said it would be noted that a better financial result had been realized than was anticipated twelve months ago, when the estimated profit on the year's working was £4961. The actual result was an increase on that amount of £623. There would have been a greater increase had it not been for two charges which had come into the year's revenue account. One was the fixing of a new engine and exhauster for oil gas, costing £200, which might have been charged to capital. The other was the cost of replacing old burners with incandescent burners for street lighting, which amounted to £514, and ought to have been charged to the Lighting Committee. These two items, added to the £623 he had already named, together with the £1323 carried forward from the previous year's profit, would have meant a deficiency of £379 only on the £8000 anticipated by the Council (not the Gas Committee), and this in spite of the fact that the increased cost of carbonizing material for the year amounted to £8337. The cost of continuing the policy of extending incandescent gas-burners for street-lighting purposes in the coming year had been included in the Lighting Committee's estimate, and would not fall on the Gas Committee. There was a decrease of about 8 million cubic feet in the sale of lighting gas. This was attributable to two causes—electric lighting and a much larger use of incandescent gas-burners, both for private and public lighting. In connection with the latter, there had been 64 additional lamps erected, with an increase of 50 lighting hours, yet through the introduction of incandescent burners, a saving had been effected in gas to

the value of £230 on the year. On the other hand, there had been an increased consumption of gas for outside lighting to the extent of 16 millions. These facts demonstrated how very desirable it was to have the illuminating power of the gas lowered; and he hoped the Council would soon take the necessary steps to have the standard reduced. The introduction of a carburettor for benzol enrichment had given great satisfaction to the Committee; and it was chiefly owing to its employment that the present financial result had been attained. They were now erecting further plant for automatic stoking and coke conveying; and when completed the works would be one of the best equipped in the kingdom. This would help to cheapen the gas. He would like to say the Engineer (Mr. John Booth) had shown every disposition to keep well abreast of the times in respect to these modern improvements, and he had been well supported by his deputy (Mr. Walmsley). The report was adopted.

GAS COMPANIES AND ELECTROLYSIS.

At the Board of Trade, on Friday, the 10th inst., Sir COURTENAY BOYLE heard an appeal against the confirmation of a Provisional Order of the Light Railway Commissioners, authorizing the construction of light railways in the city of Wakefield and the adjacent townships of Horbury, Alverthorpe, Sandal Magna, and Outwood. Among the opponents were the Wakefield Gas Company, who applied for the insertion in the Order of a clause protecting their pipes from electrolytic action.

Mr. CHALKER (Solicitor to the Company) said clauses of this kind were inserted in certain Tramway Bills last year; and he contended that a clause which could do no harm to the Light Railway Company, and would be a protection to the Gas Company, ought to be given to the latter.

Mr. *Harry Townsend*, Engineer and Manager of the Gas Company, said the soil varied considerably. In certain places the mains were duplicated. There were two large mains through Wakefield Bridge—one under each footpath. They were in places 3 ft. 9 in. from the lines of rails.

Answering Mr. VESEY KNOX, who appeared for the promoters, witness said there were places where the tramway would pass over the mains, which crossed the roads in a great many places. They were laid from 12 to 18 inches deep in the roadway. It was not possible to get them much lower than this in some places, because they had to cross the Corporation sewers. The soil did not now corrode their mains much.

Sir COURTENAY BOYLE (to Mr. Chalker): You are arguing for the Sheffield clause?

Mr. CHALKER: Yes.

Professor *W. E. Ayrton*, F.R.S., said in view of the diversity of opinion which existed as to whether electric tramways, working under the Board of Trade regulations, could or could not electrolytically damage gas-pipes, it was only fair and equitable that some protective clause should be inserted. In spite of what was said at the recent inquiry before the Committee of the House of Commons on the Bexley Bill,* he was really apprehensive lest there might be electrolytic damage. He had carefully investigated the experiments of M. Claude, and had come to the conclusion that his results were scientifically wrong. M. Claude, who represented the French Thomson-Houston Electrical Company, who had made so many tramways in France, had himself admitted a curious discrepancy in the results he had obtained—a discrepancy which was certainly in favour of the tramway companies. Allusion had been made to the experiments conducted with great care at the end of 1898 by Dr. Fleming, who came to the conclusion that there was no absolute security in the limit of 1½ volts imposed by the Board of Trade regulations. He (witness) was therefore really afraid that electrolysis might be caused by tramways working under those regulations. Nothing but time could show whether something existed in the earth which would make the laws of electricity so different. He did not see where the protection came in; and he could not help thinking that seven or ten years hence it would be found that a really serious deterioration was going on. In the interests of the tramways, he would impress upon them the importance, not merely of complying with the Board of Trade regulations, but of working far within them, which it was quite possible for them to do.

Cross-examined by Mr. VESEY KNOX, witness said he agreed that the evidence in the Bexley case should be laid before the Board of Trade. As to the results of M. Claude's experiments, the methods were entirely new; and he thought they might be fallacious. The effect of his (witness's) evidence was that it was impossible to prevent leakage except with an insulated return; but between the two methods—the insulated return such as the London County Council decided to use in their Bill of last year, and the uninsulated return working under the present Board of Trade regulations—there were many things they could do. They could have an uninsulated return with better conduction back to the generating station, with less leakage. These would reduce the danger to a minimum. They would not make electrolysis impossible, but it would be unlikely to occur. He thought modern experience was that a good deal less than 1½ volts was sufficient.

Mr. *C. H. Wordingham* supported the evidence of Professor Ayrton. He stated that, with their present knowledge, they could not say what the damage would be. He thought they should have an indemnity clause, preserving to the Gas Company their common-law rights. He could not say, with their existing knowledge, that there must be a minimum of pressure and current before electrolysis was possible or imminent.

Mr. W. L. WILLIAMS, who appeared for the Gas Company, contended that there was at least the possibility of injury; and if this was so, the Company should have protection.

Sir COURTENAY BOYLE said it was obviously desirable that the decision of the Board of Trade should not be given that day. Several Bills were before the Legislature; and if the Board put the Sheffield clause into the Order, that would be argued strongly before the Committees of the House. The Board would therefore reserve their decision on the whole question for the present.

* A report of the proceedings referred to will be given in our "Parliamentary Intelligence" next week.—ED. J.G.L.

ELECTRIC LIGHTING NOTES.

The Electric Lighting Committee of the Portsmouth Town Council report a deficit of £1000 on the past year's working, attributed to the heavy expenditure on coal. The undertaking has shown a profit during the past few years.

Owing to the heavy charges made by the Peterborough Corporation for the supply of electricity, a number of customers have given notice to discontinue taking the current. The system was only inaugurated in December last.

The Electric Consumers' Association, which was inaugurated at a conference of Members of Parliament and others at Westminster on the 2nd inst., is now at work. The object is to safeguard the interests of electric light consumers, especially as regards pressure and rates.

The Newport (Mon.) Town Council have, after a great deal of discussion, adopted a site for a new electricity station, and also tenders amounting to £55,056 for the beginning of the work. This station is required principally, if not entirely, for power purposes in connection with the tramways.

The electricity undertaking of the Plymouth Corporation shows a profit insufficient to meet the capital charges. For the year ending March 31 last, the gross profit was £1192. But the interest, sinking fund, and other charges totalled £3097; so that there remained an actual loss on the year's working of £1905.

A further sum of £20,000 is required for electric lighting purposes by the Lowestoft Town Council; and the customary Local Government Board inquiry was held last Wednesday by Mr. W. O. E. Meade-King. It is proposed to extend the light to the whole borough; and this will cost about £10,000. Some of the balance is needed for present and prospective additions to the plant.

The Royal Borough of Windsor does not appear to have obtained thoroughly reliable lighting for the streets by discarding gas for electricity. At the last monthly meeting of the Town Council, it transpired that the Head Constable had reported 198 electric lights extinguished in the past half year, for which the Electric Light Company had incurred fines to the amount of £9 18s. A curious circumstance arose in connection with the matter—namely, that the Town Clerk, as Solicitor to the Company, would have, in that capacity, to defend proceedings taken by himself to recover the penalties. He was, however, relieved of embarrassment in this respect, as he stated that, if application were made, there would be no difficulty in obtaining payment.

Delegates from the London Borough Councils had a conference with the London County Council Highways Committee at Spring Gardens, last Thursday afternoon, to discuss the question of the supply of electricity in bulk. It was pointed out that several companies were seeking parliamentary powers to undertake this work, and fears were entertained that the position would be endangered of those Local Authorities who had already entered the electric lighting business. The conference reaffirmed a resolution passed at a similar gathering three years ago, approving of a supply of electricity in bulk by the Council to Local Authorities. It was further decided that the Council should be asked to draft a suitable Bill to be submitted to the authorities for confirmation.

At the fourth annual general meeting of the Calcutta Electric Supply Corporation, Limited, the Chairman (Colonel A. J. Filgate, R.E.) gave the following particulars in regard to the progress of the concern: At the end of 1899 there were upon the system 115 houses, and the lamps and motors connected therewith were the equivalent of 9463 8-candle power lamps. A year later, they had 409 houses, and the lamps and motors connected to the system were equivalent to 28,748 8-candle power lamps. The number of units sold for lighting purposes was 199,829; in addition to which 213,121 units were sold for power, chiefly for electrical fans—making the total 412,950. The gross revenue for the year amounted to £11,147, in earning which there was expended a sum of £5752. This left a net revenue of £5395. Adding to this amount the balance brought forward from 1899 and the bankers' interest, there was produced a total of £6353 at the credit of the net revenue account. An interim dividend was paid last November at the rate of 3 per cent. per annum, which required £1436; and the Directors recommended a final dividend at the rate of 4 per cent. per annum, which would make the full dividend for the year 3½ per cent. It was proposed to place a sum of £2500 to the credit of the depreciation account, and carry forward £327.

A Local Government Board inquiry was recently held at the Municipal Buildings, Colchester, by Mr. W. O. E. Meade-King, with respect to an application by the Council for sanction to borrow sums amounting to £15,900 for purposes of electric lighting. Mr. A. R. Sillar (the Electrical Engineer) stated that they had overspent upon the last loan of £6500 to the extent of £664, chiefly owing to the fact that more meters were required than they expected, and to the rise in the price of copper. A sum of £6500 had already been expended to meet the requirements of the consumers, in mains and professional fees, including £75 paid to the Borough Surveyor (Mr. H. Goodyear), who had discharged the duties of engineer. The Inspector said he doubted very much whether the Local Government Board would sanction such a payment out of the borrowed money. It was further explained that £1970 would be required for alterations to machinery necessitated by the proposed doubling of the voltage. The extension, said the Electrical Engineer, was necessary, because they had a great many more consumers than were anticipated; the change of voltage was called for, because last winter, during a heavy load, the loss was found to be 7½ per cent. They were also to have electric tramways; and for these they would require more power. It was intended to increase the number of accumulators, to re-wind two motors, and make alterations necessary for the higher voltage, &c. The rest would be for the generating station extension, the building of an underground water-feeder,

purchasing a new engine, &c. The Town Clerk (Mr. Wanklyn) explained, with reference to the amount paid as remuneration to the Surveyor, that he had carried on the work, which would have cost the Electric Lighting Committee considerably more had it been done by another engineer. The Surveyor said he had done £10,000 worth of work, and the Committee might have had to pay another engineer 5 per cent. on this amount. A statement of the financial position of the undertaking was furnished, and the inquiry closed.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

I have got into a dull season, and shall probably be similarly situated for a week or two, till the whirlwind of annual accounts bursts upon me. On that subject, there will probably be some misunderstandings, because, under the Town Councils Act, which has come into operation this year, accounts are required to be balanced as at May 15; and unless there be special statutory provision to the contrary, municipalities ought to conform to this regulation. Some of them have been in the habit of balancing at other dates; and in their case the new law may be overlooked this year. I observe that in Arbroath the Corporation are aware of the altered state of matters, and have taken the balance as at May 15.

In Forfar, the Corporation have this week entered into contracts for the yearly supply of coal for the gas-works. Between 3000 and 4000 tons have been purchased, at an average price of 18s. 9d. per ton, as against 21s. 9d. per ton last year. This is a reduction of 3s. per ton, which is certainly very satisfactory.

The consumption of gas in Broughty Ferry is now about 50 million cubic feet a year, which is double what it was in 1892. The extension of the gas-works is therefore imminent. Probably there would be no difficulty in arranging for this being done, were it not that the subject has got mixed up with a proposal to proceed with an electrical station at the gas-works. There is a further complication, in this respect—the borrowing powers for gas-works purposes are now getting on towards exhaustion. In the working out of the problems raised, Mr. Forbes Waddell, the Manager, reported to his Committee that the capacity of the existing purifiers is a million cubic feet per 24 hours, and that they cannot well be enlarged on their present site. The holder capacity can be increased from 245,000 to 695,000 cubic feet; and the condensers, exhausters, scrubbers, and station meters can be altered so as to deal with a million cubic feet per 24 hours. With such extensions, calculating the rate of increase in the consumption of gas on the basis of the growth during the past two years, he estimates that they might be able to continue on the present site for twenty years. In his opinion, however, it is advisable that they should erect a new retort-house to meet the demand for gas during that period, and equip it with coal and coke trimming plant, chimney, and boiler. The cost he estimates (of the retort-house, I understand) at about £4000. The Committee, by a majority, agreed to recommend the Council to proceed with the work as suggested by Mr. Waddell, and to call in the services of both a gas and an electric expert. At a meeting of the Town Council this week, Provost Gray moved that the recommendation of the Committee be not adopted, but that they delay consideration of the matter for a year. There was, he said, no question of their being dissatisfied with the Manager; but they were being too frequently asked to go in for extensions. The policy of providing free connections for cookers had tempted customers to use gas for cooking and heating purposes, and had led to a great increase in the capital expenditure on the works being necessary. There was a likelihood that the price of coal would be reduced this year; and on this account there was the probability that people might go back to cooking and heating by coal, and that the increase in the consumption of gas might not be maintained. If, after delaying for a year, it was found that the demand for gas continued, the question of extension could be taken up and adopted if found necessary; but in the meantime he urged that the need for doing so had not arisen. He asserted that there was no available site at the gas-works for electric light plant It was not a gas expert who was required, but a financial expert to explain to the ratepayers the growth of the capital account. Mr. Kidd, in moving the adoption of the Committee's recommendation, said the members appeared to be afflicted with periodic fits of depression in regard to gas affairs. They ought not to rush into buying an expensive site for electric lighting plant. By providing a site at the gas-works, a saving would be effected; and expert advice should be secured. Bailie Christie emphasized the point that the Gas Manager had stated that he did not see his way to provide for requirements during next winter with the existing plant at his disposal; his estimate being that there would be an increase this year of 4 million cubic feet of gas consumed. He was prepared to prove that the policy of supplying free fittings for cookers, instead of being a drag on their finances, was a source of revenue. By having the electric light site at the gas-works, a saving of something like £500 per annum would be effected. There was plenty of room for it there; and the Gas Manager knew a good deal more about electric lighting matters than most members were perhaps aware of. By the casting vote of the Provost, the Council disapproved of the Committee's report, and delayed the subject for a year. Thereafter Provost Gray gave notice of the following motion: "(*a*) That the resolutions of the Commissioners contained in the minutes of July 10, 1889, Aug. 7, 1899, and Aug. 14, 1899, be rescinded, and that in future all laying of service-pipes and connections be carried out in accordance with section 30 of the Broughty Ferry Commissioners Gas Act, 1870; (*b*) that all gas-cookers or other apparatus issued on hire by the Town Council be charged at the rate of 10 per cent. per annum on the list prices of such apparatus; (*c*) that the price of all apparatus purchased and issued by the Town Council for hire be charged to a special capital account, and that the price of the apparatus be written off at the rate of 10 per cent. per annum; (*d*) that the value of the apparatus in stock or in use shall be ascertained by taking the original cost, subject to depreciation at the rate of 10 per cent. per annum from the date of purchase, and that the net value as so ascertained shall be added to the aforesaid special capital account." I hope this does not mean retrogression on the part of the Corporation in gas matters. Probably, given a little time, Mr. Waddell may be able to get the Town Council to be of his way of thinking.

It is reported that the old Cowdenbeath Gas Company have resolved to re-start the manufacture of coal gas in the old works, which were destroyed by fire, if a more suitable site for new works cannot be found. From this it would appear that there is little likelihood of the Town Council taking up the duty of lighting the town, one of the first conditions of which should be the acquisition of the undertaking of the Gas Company.

Mr. G. Keillor, jun., of Peterhead, reports an increase in the output of gas during the month ending April 15, as compared with the corresponding month of last year, equal to 12¼ per cent.; and as compared with the same period two years ago, equal to 24¼ per cent. This great advance has been almost entirely due to the adoption of gas-cookers. In order to further encourage their use, the Town Council have agreed, on Mr. Keillor's suggestion, to fit up slot cookers free of charge and free of hire The average yearly consumption of gas per slot meter and cooker is 15,000 cubic feet.

It has been reported to the Edinburgh Town Council this week by Mr. Mackenzie, the Convener of the Electric Light Committee, that all electric lighting of the streets had cost the city beyond the expenditure for gas lighting was £7000. For this sum, they had abolished 3000 gas-lamps, and had provided 847 arc lamps. I suppose Mr. Mackenzie must be taken to mean £7000 a year, which is about equal to 1d. in the pound upon the rates.

The Corporation of Glasgow have been in the Law Courts over another contract in connection with their gas undertaking. On Thursday, Counsel were heard in the First Division of the Court of Session, in an appeal by the pursuers in an action raised in the Sheriff Court at Glasgow by John Paterson and Son, Limited, Contractors, of Glasgow, against the Corporation, under the Corporation Gas Acts. The pursuers sued for £12,974 as a balance due to them under a contract for the excavation for the new gasholder tank at the Temple gas-works. The contract was entered into in September, 1897, at the price of £20,810. The pursuers said that the plans and conditions of the contract showed about 25,170 cubic yards of freestone to be excavated by blasting under such conditions as should be prescribed by the Engineer. They estimated for the excavation of freestone; but in the execution of the work it was found that different and extra work from that contracted for was required. They were refused permission to use explosives, and were thus under the necessity of employing a more expensive mode of doing the work. The entire cost, they maintained, was a proper charge against the Corporation under the contract. Otherwise they contended that the Corporation were in breach of contract in refusing to allow the natural, usual, and proper mode of excavating rock. The position of the Corporation, it was said, was taken up on account of their dread lest injury might result to a neighbouring gas-tank; but this fear, it was maintained, was groundless. The total cost of the work was £33,896, on account of which they had been paid £20,922; leaving the sum sued for due. The defenders denied breach of contract; and said that it was a condition that no blasting should be allowed unless with the sanction of the Engineer, Mr. W. Foulis. They also said that there was no work executed by the pursuers which was different from that contracted for; and that no work was done which the pursuers were not obliged to perform. The pursuers failed to execute the contract within the stipulated period; and, on account of that failure, the Corporation had sustained loss considerably in excess of any sum claimable by the pursuers. Sheriff-Substitute Strachan dismissed the action as irrelevant, with expenses. Their Lordships of the First Division, holding that there was nothing alleged which was consistent either with extra work or with breach of contract, affirmed the decision, with additional expenses.

Mr. James Manwell, who has for many years been the Station Manager at the Dalmarnock Gas-Works of the Glasgow Corporation, has been recommended by his medical adviser to take a voyage to Australia and New Zealand for the benefit of his health. On a report by Mr. W. Foulis, the General Manager, the Sub-Committee on Works have granted him leave of absence for four months. Few persons have been more persistent in their attention to duty over many years, and have troubled the Gas Committee less, than Mr. Manwell; and he leaves with the good wishes of his colleagues that the voyage may prove beneficial.

Mr. Robert Wilson, the Treasurer of the Corporation Water Department of Glasgow, in a report submitted to the Water Committee, stated that he estimated the revenue of the department for the year 1901-2 at £208,053, and the expenditure at £221,513; leaving a deficit of £13,460. There was an estimated credit balance from revenue account of £7544; so that the estimated net deficiency was £5916. The deficit was mainly due to an increase of £8000 in interest charges during the past year, and the cessation of the steady expansion of the demand for water for trade purposes which had been going on during the past decade. There had also been an increase in the working expenses; and the decision by the House of Lords with reference to the payment of teinds represented an expenditure of £4000. It was unanimously agreed by the Committee to retain the domestic rate within the limits of the compulsory supply at 5d. per pound, and outside the limits of such supply at 10d. per pound; also to retain the public water-rate at 1d. per pound, but to raise the meter charge from 30s. per 100,000 gallons to 33s. 4d.—the 3s. 4d. increase being the amount of the reduction which took place two years ago. These rates were agreed to on Thursday.

New Joint-Stock Companies.—The Indiana Oil and Gas Company, Limited, has been registered with a capital of £100, in £1 shares, to acquire certain oil lands in Indiana, or elsewhere in America, to develop the same, and to carry on the business of refiners, manufacturers, and sellers of oil, gas, asphalte, and minerals, &c. The Incandescent Trust, Limited, has been formed with a capital of £15,000, in £1 shares, to adopt an agreement with V. C. West, and to carry on the business of gas-fitters, ironfounders, electricians, and producers and suppliers of gas and electricity for the purposes of light, heat, or power, &c. The control of the Company, primarily, is vested in a Council, the first members (to number not less than three nor more than 25) of which are E. A. F. Schilze, J. Altman, H. Ogus, and S. Mellor.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 18.

Sulphate of Ammonia.—Demand has been well sustained throughout the week, excepting on the east coast, which has been somewhat neglected; and the closing quotations are £10 12s. 6d. per ton f.o.b. Hull, and £11 f.o.b. Leith and Liverpool. Everything available for prompt delivery has been readily disposed of, and considerable sales for June delivery have been made at current prompt prices. A large business in the forward position has also been done—July-December delivery at up to £11 per ton f.o.b. Leith, ordinary terms, and October-March at up to £10 17s. 6d. per ton. London quotation has also been advanced to £11 per ton, Beckton terms, for prompt or forward delivery.

Nitrate of Soda.—Interest in nitrate of soda has been maintained; and in the forward position producers and importers are very firm at the advance. Spot quotations have also been put up—ordinary quality to 8s. 7½d. per cwt., and refined to 8s. 10½d.

LONDON, *May* 18.

Tar Products.—Benzol is decidedly better; the demand having improved considerably, especially for forward delivery. There is a very good inquiry for July-December shipment, and a London maker is reported to have declined 10d. over this period. Creosote is also firmer; and the demand has improved. There are one or two large inquiries in the market from railway companies, which will still further tend to harden the value. Of course, the large quantities consumed as fuel by various tar distillers must have had a considerable effect on the stocks, which are now greatly reduced. Solvent is decidedly weak; and it is difficult to understand the position of this article. Carbolic acid is rather easier, doubtless owing to the quantity of crystals of German make which are being offered from time to time on this market. Anthracene is utterly lifeless. It is difficult to name a price at which consumers would purchase.

The average values obtaining during the week are: Tar, 14s. to 17s. 6d. Pitch, east coast, 29s.; west coast, 27s. Benzol, 90's, 8½d. to 10½d.; 50's, 8d. to 9d. Toluol, 11d. Crude naphtha, 4d. Solvent naphtha, 1s. Heavy naphtha, 11½d. to 1s. 1d. Creosote, 1½d. Heavy oils, 2d. Carbolic acid, 60's, 2s. 5d. Naphthalene, 80s.; salts, 50s. Anthracene, "A," 2½d.; "B," 2d. (nominal).

Sulphate of Ammonia.—The market continues firm; and there is a very strong demand prevailing, principally for shipment from London and Liverpool. As regards Beckton, the price asked is £11 in any position; and the Gaslight and Coke Company appear indifferent as to selling forward. Business at Hull has been rather restricted; and there are still sellers at £10 12s. 6d., while buyers offer only £10 10s. for ordinary makes. Business at Leith is reported at £10 12s. 6d. to £10 13s. 9d. for ordinary and £10 15s. for special makes, May-June shipment. As regards Liverpool, good grey has been sold at £11 to £11 1s. 3d.; but discoloured realizes only £10 15s. to £10 16s. 3d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Although the Lancashire coalowners have declined to commit themselves to the extraordinary proposal put forward by the Executive Council of the Mining Association of Great Britain, that the amount to be raised by the coal tax should be spread over the whole output of the United Kingdom, they are taking other measures to check the downward move in prices. The adoption of a general system of short time has been strongly recommended, but has not yet been decided upon definitely. In the meantime, the gas coal season is getting into fairly full swing; and the tenders for one or two of the larger contracts are now under consideration. So far, a reduction of 2s. 6d. per ton on last year's prices has represented the basis for the smaller contracts that have been settled, with 11s. per ton at the pit for good screened gas coals representing about the average figure. The bigger contracts now pending will, however, afford a more reliable test as to the prices that will probably rule for the season. Negotiations have been going on recently with regard to the locomotive fuel contracts, which a number of the railway companies seem very indifferent about settling. In some cases they hold heavy stocks; and it is more than probable that, when they do buy, they will only place contracts for much below the average quantities. Lancashire coalowners have been struggling to maintain the basis of 10s. per ton at the pit; but this would seem to have been abandoned, as at a private meeting held last week 9s. 6d. per ton, it is understood, was generally agreed upon as the minimum. Whether this will meet the views of the railway companies is doubtful, as they seem to anticipate about 9s. per ton as the maximum price they will have to pay. In other descriptions of fuel there is a steady weakening going on. Good house-fire qualities are perhaps maintaining their price better than other sorts; and list rates in Lancashire are still maintained, though perhaps not quite so strongly, as competition from other quarters is compelling concessions here and there where there is a risk of regular trade being lost. Collieries, however, are short of stocks; and the approaching Whitsuntide stoppages will still further restrict the output, so that they have no immediate prospect of surplus supplies that they will have to push upon the market. Common round coals are not in more than moderate request, for steam and forge purposes; and in these prices are also being forced downward by outside competition. For Lancashire steam and forge coal, prices may be quoted at from 10s. 6d. to 11s. 6d. per ton at the pit, with good Derbyshire steam coals to be bought at 8s. to 8s. 3d., and common round coals from both Staffordshire and Yorkshire offering at under local prices. The engine fuel trade continues very irregular, owing to the large surplus supplies offering on the market; and list basis prices are becoming little more than nominal, as competition has to be frequently met by concessions to buyers. At the pit, common round Lancashire slack can be bought from as low as 6s. 6d. and 7s. per ton, with the better qualities not averaging more than 8s. to 8s. 6d.; while slack from Derbyshire and other districts can

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1371.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 12	10½	Alliance & Dublin 10 p.c.	19—20	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb. .	102—104	+1	4 16 2
200,000	5	May 15	6½	Bombay, Ltd. . . .	6—6¼*	+¼	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—4¾*	+¼	5 9 5
380,000	Stk.	Feb. 14	12	Brentford Consolidated	260—265	..	4 10 7
270,000	,,	,,	9	Do. New . . .	187—192	..	4 13 9
50,000	,,	,,	5	Do. 5 p.c. Pref. .	128—132	..	3 15 9
159,375	,,	Dec. 13	4	Do. 4 p.c. Deb. .	113—116	..	3 9 0
220,000	Stk.	Mar. 14	10	Brighton & Hove Orig.	222—227	..	4 8 1
226,320	,,	,,	7	Do. A. Ord. Stk. .	160—165	..	4 4 10
1,922,500	Stk.	Feb. 27	5	Bristol, 5 p.c. max. .	119—121	..	4 2 8
420,000	20	Mar. 28	10	British.	41—42	..	4 15 3
50,000	10	Feb. 28	12	Bromley, Ord. 10 p.c. .	24—26	..	4 12 4
79,000	10	,,	9	Do. 7 p.c. . . .	19—21	..	4 5 8
500,000	10	Oct. 12	6	Buenos Ayres (New) Ltd.	9—10	..	6 0 0
220,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	97—100	..	4 0 0
150,000	20	Mar. 14	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	Sept. 28	10†	Cape Town & Dis., Ltd.	14¾—15½	..	6 9 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	51—53	..	5 13 2
550,000	Stk.	Apl. 12	12	Commercial Old Stock	275—280	..	4 5 9
236,425	,,	,,	9	Do. New do. .	205—210	..	4 5 9
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	Dec. 13	9	Continental Union, Ltd.	165—170	..	5 5 11
200,000	,,	,,	7	Do. 7 p.c. Pref.	163—168	..	4 3 4
575,000	Stk.	Feb. 28	5	Crystal Palace Ord. 5 p.c.	120—125	..	4 0 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	−2	3 16 11
486,090	10	Jan. 31	11	European, Ltd. . . .	20—21	..	5 4 9
354,060	10	,,	11	Do. £7 10s. paid	14½—15½	..	5 6 5
15,079,885	Stk.	Feb. 14	4⅞	Gas-light and Coke { 4 p.c. Ord. . .	93—95	−1	4 12 7
2,600,000	,,	,,	3½	{ 3½ p.c. max.	90—92	..	3 16 1
3,799,735	,,	,,	4	{ 4 p.c. Con. Pref.	109—112	..	3 11 5
4,063,425	,,	Dec. 13	3	Coke and { 3 p.c. Con. Deb.	93—95	−1	3 3 2
70,000	10	Oct. 26	8	Hongkong & China, Ltd.	13⅝—14½	..	5 10 4
3,800,000	Stk.	May 15	10	Imperial Continental .	210—215*	..	4 13 0
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Feb. 28	10	Liverpool United A	234—236	..	4 4 9
678,100	,,	,,	7	Do. do. B	172—176	..	3 19 7
306,083	,,	Dec. 28	4	Do. do. Deb. Stk.	120—122	..	3 5 7
75,000	5	Dec. 13	6	Malta & Medn., Ltd. .	4¾—5¼	..	5 14 3
560,000	100	Apl. 1	5	Met. of { 5 p.c. Deb.	104—107	..	4 13 5
250,000	100	,,	4½	Melbourne { 4½ p.c. Deb.	102—104	..	4 6 6
541,920	20	Nov. 14	3½	Monte Video, Ltd. . .	9½—10⅜	..	6 13 4
717,946	Stk.	Feb. 22	8½	Newc'tle & G'tesh'd Con.	227—228	+1	3 14 7
312,855	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	99—101	..	3 9 4
150,000	5	May 15	8	Oriental, Ltd. . . .	6¾—7¼*	..	5 10 4
135,000	5	,,	8	Do. New, £4 10s. pd.	5½—6*	..	6 0 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅝*	..	4 11 5
					*Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Feb. 28	7	Ottoman, Ltd. . . .	5⅝—6¼	..	5 12 0
851,070	10	Apl. 26	7	River Plate Ord. . .	10½—11¼	..	6 4 5
250,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb. .	98—100	..	4 0 0
250,000	10	Mar. 28	8	San Paulo, Ltd. . . .	11—12	..	6 13 4
135,000	Stk.	Mar. 14	10	Sheffield A	235—240	..	4 3 4
203,984	,,	,,	10	Do. B	234—236	..	4 4 9
523,498	,,	,,	10	Do. C	234—236	..	4 4 9
5,761,885	Stk.	Feb. 14	5	South Met., 4 p.c. Ord.	123—128	−5	3 18 2
1,547,965	,,	Jan. 16	3	Do. 3 p.c. Deb. . .	93—96	..	3 2 6
380,940	Stk.	May 15	5	Southampton Ord. . .	106—111*	..	4 10 1
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
120,000	Stk.	Feb. 28	6	Tottenham { A. 5 p.c.	115—120	..	5 0 0
250,520	,,	,,	4½	and { B. 3½ p.c.	85—90	..	5 0 0
80,100	,,	Dec. 13	4	Edmonton { 4 p.c. Deb.	109—114	..	3 10 2
182,380	10	Jan. 16	5	Tuscan, Ltd. . . .	8—9	..	5 11 1
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—102	..	4 18 0
230,000	5	Feb. 28	9	West Ham, 10 p.c. . .	9—10	..	4 10 0
147,000	10	,,	6	Do. 7 p.c. . . .	11½—12½	..	4 16 0
128,984	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
				WATER COMPANIES.			
780,499	Stk.	Dec. 28	11	Chelsea, Ord. . .	292—297	−1	3 14 1
150,000	,,	,,	5	Do. 5 p.c. Pref. .	155—160	..	3 2 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	138—143	..	3 2 11
175,785	,,	Mar. 28	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
1,720,560	Stk.	Apl. 12	7	East London, Ord. . .	188—193	..	3 12 6
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb. .	145—150	..	3 0 0
797,687	,,	,,	3	Do. 3 p.c. Deb. .	95—97	..	3 2 6
700,000	50	Dec. 13	8	Grand { 10 p.c. max..	105—108	−2	3 14 1
310,000	Stk.	Mar. 28	4	Junction { 4 p.c. Deb..	123—127	..	3 3 0
708,000	Stk.	Feb. 14	14	Kent	300—305	..	4 12 5
160,000	,,	,,	7	Do. New, 7 p.c. max..	200—205	..	3 8 4
1,043,800	100	Dec. 28	10½	Lambeth, 10 p.c. max..	270—280	..	3 15 0
406,200	100	,,	8	Do. 7½ p.c. max..	207—212	..	3 15 5
350,000	Stk.	Mar. 28	4	Do. 4 p.c. Deb..	123—126	..	3 3 6
500,000	100	Feb. 14	13¾	New River, New Shares	405—410	..	3 7 1
1,000,000	Stk.	Jan. 31	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
902,300	Stk.	Dec. 13	7	South-wark { Ord. . . .	188—193	..	3 12 6
126,500	100	,,	7	{ 7½ p.c. max.	177—182	..	3 16 11
489,200	Stk.	,,	5	and { 5 p.c. Pref. .	153—158	..	3 3 3
1,019,585	,,	Apl. 12	4	Vauxhall { 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex. . .	265—275	..	3 12 9
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
200,000	,,	Mar. 14	3	Do. 3 p.c. Deb. .	96—98	..	3 1 3
					*Ex. div.		

† Next dividend will be at this rate.

be purchased at from 4s. 6d. and 5s. per ton upwards. Shipping is only quiet, with prices easier; 11s. 6d. to 12s. per ton being now quoted for steam coals, delivered at the ports on the Mersey. Coke is perhaps a trifle steadier; and at the ovens prices are scarcely quoted under 24s. to 25s. per ton for good Lancashire foundry, and 12s. 6d. to 13s. for best Lancashire washed furnace cokes.

Northern Coal Trade.—There has been a brisker trade in the last few days; and the approach of the holidays will give further activity. In the steam coal trade this briskness is perhaps most apparent, as there are large quantities of coal being sent to the Baltic ports; and there is naturally a strong desire to get contracted coals away during the time the rebate applies. Best Northumbrian steam coals are now firm at 13s. per ton f.o.b.; and the production seems sold for some little time ahead. Steam smalls are not so active, and may be quoted at from 6s. to 6s. 6d. In the gas coal trade there is a very full demand, for though the home consumption is less, and the deliveries on these contracts are now lower, there is an enlarged business for export, and some pressure to get away quantities is seen; so that for occasional cargoes of best Durham gas coals as high as 10s. per ton f.o.b. is quoted by some of the collieries, who are well placed for export orders. It is possible, however, that after the holidays there may be a little relaxation of prices. In the coke trade, there is a rather better demand; best export coke being now 17s. 6d. to 18s. 6d. per ton f.o.b., and blast-furnace coke from 15s. to 16s. per ton at the Teesside furnaces. Gas coke is rather steadier. The prices quoted are substantially the same as those last reported.

Scotch Coal Trade.—Business current is still of the hand-to-mouth order. Little forward business is being done; parties being disposed to wait till it be seen how the Conciliation Board are to deal with the question of wages. In the meantime, the Board have been unable to come to any decision, because the representatives of the miners have exercised their right of calling in a neutral chairman as arbiter. The names of Lord James of Hereford and of Mr. Andrew Jameson, K.C., Sheriff of Perthshire, are spoken of as likely men for the appointment. Meantime, the delay is perhaps welcome to both parties. While export business is slack, there is a good volume of home trade, and better prospects, as the shipbuilding trade is exceptionally busy. The prices quoted are: Main 9s. 3d. to 9s. 6d. per ton f.o.b. Glasgow, ell 11s. to 12s., and splint 10s. 6d. to 10s. 9d. The shipments for the week amounted to 213,554 tons—a decrease of 17,934 tons upon the preceding week, and of 21,692 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,110,152 tons—a decrease of 549,375 tons upon the same period of the previous year.

The Barrow County Council have granted an honorarium of £500 to the Borough Engineer, Mr. W. H. Fox, for the special services he has rendered in connection with the construction of the Harlock reservoir and aqueduct. The proposal emanated from the Gas and Water Committee.

Huddersfield Gas Supply.—At the meeting of the Huddersfield Town Council last Wednesday, the Chairman of the Gas Committee (Alderman Stocks), in moving the adoption of their minutes, said that, under the special circumstances, the balance-sheet was very satisfactory. The gross profit was £24,347; and, after payment of interest upon stocks and loans, and allowing for contributions to the loan and sinking funds, there would be a net profit available for allocation of £9337. Of this sum £3456 had been transferred to the borough fund in reduction of the rates, leaving £5881 to go towards the repayment of the debt upon the reconstruction fund, thereby reducing it from £37,204 to £31,323. He pointed out that it was important that this liability should be wiped off, as it cost the Gas Department about £1800 per annum for interest, or more than a rate of 1d. for the whole borough. Since the transfer of the gas undertaking to the Corporation, after deducting £3230 received from a rate-in-aid in 1896, a sum of £135,151 had been contributed to the relief of the rates out of the gas-works revenue. The capital account stood at £322,655, which, added to the reconstruction fund balance last year of £37,204, made a total liability of £359,859. Allowing for the increased price of coal and the rapidly declining value of residuals, it was estimated that the net profits next year would be about £6433, and no contribution would be available for the reduction of the rates, while the reconstruction fund would probably be undiminished, or reduced by only a nominal amount. The minutes were passed.

Coal Mining Statistics.—According to a return presented to the House of Commons, showing for the United Kingdom and the principal coal mining districts the quantity and value of coal produced and the number and average wages of coal miners in each year from 1886 to 1900, together with the estimated amounts expended on miners' wages and remaining for other expenses and coalowners' profits in the United Kingdom in each year, the output in the first-named year was 157,518,000 tons, worth, at 4s. 10·12d. per ton at the pit mouth, £38,146,000; and of this sum £26,396,000 represented wages paid, leaving £11,750,000 for other expenses and for profits. The output for 1891 was 185,479,000 tons; and the value increased much more rapidly, amounting to £74,100,000. During this period, the wages rose from £26,396,000 to £48,149,000, or about 82 per cent., while the balance vaailable for other expenses and for profits more than doubled. In 8192 there was a reduction of the output to 181,787,000 tons, valued at £66,050,000; and in 1893 (the year of the great strike), the output fell to 164,326,000 tons, valued at £55,810,000. Since 1893 there has been a rapid increase of production, culminating in a total output for 1900 of 225,170,000 tons, valued at £121,649,000; the price at the pit mouth having risen from 6s. 9·51d. to 10s. 9·66d. per ton. Between 1893 and 1897 the amount paid in wages declined a little; while "other expenses and profits," which in 1894 recovered to £17,150,000 from the low level to which they had fallen in the previous year, showed no tendency to increase. The tables from which these figures are extracted contain much other information of great interest to all coal users, and will well repay careful study.

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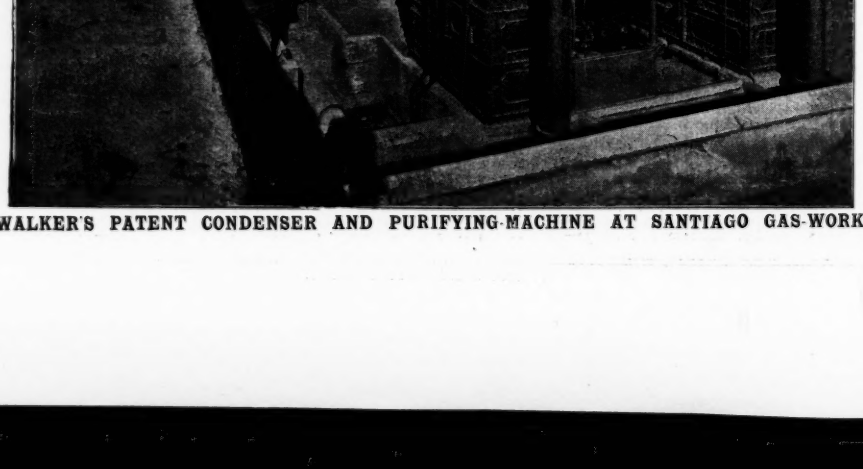

THE ANNULAR CONDENSER FITTED WITH WATER COOLING ARRANGEMENT COOLS DOWN THE GAS TO THE WATER TEMPERATURE IN THIS HOT CLIMATE.

WALKER'S PATENT CONDENSER AND PURIFYING-MACHINE AT SANTIAGO GAS-WORKS.

Cape Town and District Gaslight and Coke Company, Limited.—The Directors recommend a dividend on the ordinary shares at the rate of 11 per cent. per annum for the half year ended Dec. 31; making a total dividend of 10 per cent. for the past year, as compared with 9 per cent. for the previous twelve months. A sum of £7500 has been placed to reserve, and £1684 is carried forward.

Gas-Meters in Leeds.—For the first time in the history of the Leeds Corporation Gas Department, the number of meters in the city has reached six figures. On the 30th ult., according to a return which has been placed in the hands of a Corporation Sub-Committee, there were in use 86,951 ordinary meters, 9454 prepayment meters, and 3817 prepayment meters connected with "cookers"—giving a total of 100,222 meters.

Loughborough Corporation Gas Committee and the Gas Company.—At the last monthly meeting of the Loughborough Town Council, the Gas Committee presented a special report with reference to the dispute between the Gas Company and the Committee as to the outstanding claims of the former. It was as follows: "The Gas Company, after several applications from the Town Clerk for the same, on Nov. 15, 1900, delivered a statement of the amounts which the Company alleged the Corporation were liable to pay, amounting in the whole to £5745 16s. 4d. In a letter of the Company's Solicitors, which accompanied the statement, a definite reply was asked for as to whether or not the Corporation would pay the sums claimed within fourteen days of that date; and it was stated that in default process would be issued. The Committee had not up to this date been able to ascertain what was the amount of the Company's claim, although repeated applications had been made for a statement showing what it was. The Town Clerk replied on the 20th of November that the accounts should be examined and investigated as promptly as possible, but it was unreasonable to expect the Committee's decision in fourteen days. The Committee, having been advised by the Town Clerk that they were not liable for a considerable portion of the claim, and having taken the opinion of Counsel which confirmed that given by the Town Clerk, replied on Jan. 2, 1901, to the Company's Solicitors, objecting to the disputed items of the claim. The Solicitors wrote on Jan. 7, 1901, suggesting that the matters in dispute should be referred to arbitration; but the Committee, being advised that the questions involved were purely legal, replied that they could not consent to arbitration, and that the points in dispute would be best dealt with by the ordinary tribunal in the usual way. On March 20, 1901, the Gas Committee tendered to the Gas Company the sum of £394 7s. 11d. in settlement of their claims. The Company refused, and on April 12, 1901, the Corporation were served with a writ issued by the Company for the recovery of £2848 14s. 6d., this being £2897 1s. 10d. less than the original claim. Previous to the service of the writ there had been no intimation from the Company that they were prepared to accept less than £5745 16s. 4d., the amount of the original claim. An appearance has been entered to the writ, and the Committee are proceeding to defend the action on the items in dispute." The report was adopted.

Increase in the Price of Gas at Salford.—At the meeting of the Salford Town Council to-morrow, the Gas Committee will recommend that the price of gas be increased by 4d. per 1000 cubic feet from June 24 next.

Coventry Gas and Electricity Supplies.—The consumption of gas in Coventry for the year ended March 31 last amounted to 559,690,000 cubic feet, which is a record, being 3,720,000 cubic feet in excess of 1899-1900, which was far in advance of any previous year. The increase, however, was not steady throughout the twelve months, as in the quarter ended March 31 last, there was a slight decline, compared with the same period of 1900. The electric light continues to add to the number of its customers. The number of consumers on March 31 of the present year was 331, against 226 on the corresponding date of the previous year.

Halifax and the Sowerby Bridge Gas-Works.—There is at present before Parliament a Bill to confirm a Provisional Order dealing with the application of the Halifax Corporation to purchase the portion of the Sowerby Bridge Gas-Works within the borough. Power is given to the District Council to sell to the Corporation this part of the undertaking, "together with all pipes, mains, lamps, meters, stoves, and other apparatus for the supply of gas within the gas areas, and all rights and powers of the Council in connection with, or in relation to, such supply." The purchase by the Corporation is to be deemed to be one of the purposes of their gas undertaking, for which the Corporation may, under section 39 of their Act of 1898, borrow the sum of £150,000; and any sum borrowed for the purchase is to be repaid within such period, not exceeding 30 years from the date of borrowing, as the Corporation, with the sanction of the Local Government Board, may determine.

The Installation of Water-Gas Plant at Carlisle.—At the meeting of the Carlisle Town Council last Tuesday, the minutes of the Gas Committee contained Messrs. Corbet Woodall and Son's approximate estimates of the cost of the proposed installation of carburetted water-gas plant at the gas-works. They were as follows: Messrs. Humphreys and Glasgow's tender, £5446; buildings for the plant, chimney-shaft, tar-well, and foundation works, £2500; cast-iron water-tank bearers, £450; new men's room, £250; purifiers and connections, £2000; purifier foundations and shelter-sheds, £775; foundations to oil-tank, £100; station meter, exhausters, and gas-engines, £1000; meter-house and exhauster-house, including machinery, &c., foundations, £550; lime-shed and storage for spent lime, £500; oil and gas connections and alterations to present mains, £500—total, £14,071. As mentioned in the "JOURNAL" last week, the Committee approved of the plans, specifications, &c., submitted by Messrs. Woodall and Son, and requested them to advertise locally for tenders for the building work in connection with the proposed scheme, and submit them to the Committee. They also decided to accept Messrs. Humphreys and Glasgow's tender. Mr. Coulthard moved the adoption of the minutes, observing that the Committee hoped the installation would be completed before the next busy season. The motion was agreed to.

RICH-

MOND GAS

STOVES.

The New Water-Works for Paignton.—The Paignton Town Council have decided to invite tenders for the construction of the reservoir and works at Holne Moor in connection with the proposed new supply of water from Dartmoor. Mr. Dart, a member of the Council, was of opinion that the tenders should be for the complete undertaking, including the pipe-line, which is to be about 17 miles in length. He thought it would be cheaper to have the whole scheme included in one contract, besides which iron was probably as cheap now as it would be. The Chairman (Mr. R. Waycott) said the Water Committee had the opinion of the highest authority that iron would go still lower. Time would be lost in getting out the second specifications, and time now was of the utmost importance. Mr. F. W. Vanstone, the Resident Engineer, pointed out that it would take a month to get out the specifications of the pipes. Mr. Lambshead, Chairman of the Water Committee, said Mr. Baldwin Latham, the Consulting Engineer for the scheme, strongly advised them to proceed with a part and not the whole of it. Upon this explanation, Mr. Dart withdrew his opposition, and the recommendation of the Committee as to the tenders was thereupon adopted without further discussion. Mr. Vanstone was instructed to get out the plans and specifications for the necessary pipe-line forthwith.

The Gas-Works Extensions at Middlesbrough.—The Gas Committee of the Middlesbrough Corporation having asked Mr. Corbet Woodall for an explanation in respect to the increased cost of carrying out the work in connection with the recent extensions at the gas-works, he has sent the following reply: "The contract sum of £4500 was for the foundations and walls only of the retort-house; the certified sum of £8937 3s. 7d. included the rest of the builders' work necessary for the completion of the house. With regard to the foundations, the information at my disposal justified the belief that the foundations shown upon the drawings were sufficient. But when the excavations were in progress, it was discovered that at one end of the house it was necessary at one place to use piling; and the depth of the concrete foundations for the walls, instead of being 13 ft. 6 in. below the surface, had to be taken for some distance—nearly 7 feet—deeper. At Mr. Terrace's suggestion, with which I entirely concurred, the floor of the coal-store was lowered; thus making use of the deeper foundation walls, and considerably increasing the capacity of the store. The result in cost was that the foundations, exclusive of the walls, amounted to £4782 16s. 7d. When the foundations were finished, there was considerable delay in proceeding with the work, in consequence of labour difficulties, and in the meantime a schedule of prices had been arranged for the completion of the house. This schedule is, I think, in your hands; the date being March, 1899. The work was measured and priced at the schedule rate; the cost of completing the builders' work above the concrete foundations was £4154 7s. It will be noticed that the original amount was not for the completed house. It did not include slating, plumbing, drainage, or the foundations for the retort-bench—the latter being a considerable item. In the other nine completed contracts on the statement, the amount paid in settlement was less, in the aggregate, than the amounts of the contracts."

Swindon Water Supply.—The Swindon Corporation were last Tuesday engaged in considering the report of Mr. T. E. Redman with regard to an auxiliary supply of water for the borough; and it was decided to instruct him to carry out the trial borings which he recommended—a special Sub-Committee being appointed to superintend the operations. Numerous complaints having been received as to the hardness of the water supplied to the consumers, Mr. W. H. Williams was requested to prepare a sketch of the work, and an estimate of the cost of softening 150,000 gallons of water per diem. Cloth filtering has hitherto been in use at the water-works; but the Corporation have decided to abandon the system, and substitute a covered sand filter.

Water by Meter at Warrington.—The Water Committee of the Warrington Corporation have lately submitted to the Borough Council a resolution that the following scale of charges for water by meter, to take effect on and after the 25th of June next, be approved: For any quantity up to 200,000 gallons at 1s. per 1000 gallons, but not less than 10s. per quarter; for any quantity exceeding 200,000 gallons, and up to 5,000,000 gallons, at 1s. for the first 200,000 gallons, and 9d. for every additional 1000 gallons; for any quantity exceeding 5,000,000 gallons, at 1s. for the first 200,000 gallons, and 8d. for every additional 1000 gallons, but not less than £190 per quarter. Alderman Francomb explained that the question of the charges for water by meter had engaged the attention of the Committee for the past two years. They found they were not making a profit, and they felt it was not their duty to go on supplying water at a loss. By the re-arrangement of the charges, the Corporation would gain considerably, and the smaller consumers of the town would also be benefited. The resolution was adopted.

Malmesbury Corporation and the Water-Works.—The Malmesbury Corporation had before them last Tuesday the award of the Umpire (Sir J. Whittaker Ellis) fixing at £6540 the amount to be paid to the Malmesbury Water Company for their undertaking (*ante*, p. 1252). The Mayor (Mr. H. Farrant) and most of the members of the Corporation admitted that the amount was higher than they had expected; but, in the interests of the community, it was decided to apply to the Local Government Board for permission to purchase the undertaking at the price. This was agreed to *nem. con.* The Town Clerk pointed out that the liability of the Corporation would not end there, as a considerable sum would have to be spent in putting the works and plant into an efficient condition. It was suggested that Mr. J. W. Restler, Engineer of the Southwark and Vauxhall Water Company, who acted for the Corporation throughout the negotiations, should be retained to examine the works, and advise as to the expenditure necessary to put them into such an efficient state of repair as would meet the requirements of the Local Government Board; and the General Purposes Committee were empowered to avail themselves of Mr. Restler's services. The Town Clerk pointed out that the high figure fixed by Sir John Whittaker Ellis was the result of the conclusion he had formed as to the great value of the springs from which the Company obtained their supply, which would, he considered, be sufficient for the needs of Malmesbury no matter what increase might take place in the population.

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COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Cont.)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

ORDERS RECEIVED IN 1901 TO MARCH 1 . . . . 3,500,000 CUB. FT. DAILY.

Strike of Gas Stokers in Cork.—Owing, as we understand, to a dispute on the subject of the hours of labour, the stokers at the Cork Gas-Works struck last Friday, and at night the city was plunged in darkness, except in those parts in which other illuminants could be brought into use. A good deal of public indignation was manifested against the men, and a great number of volunteers were enrolled to take their places. The strike continued on Sunday evening.

Uckfield Gas Company.—The annual meeting of this Company was held on the 7th inst. The report showed that the Company had a very successful year; the receipts for gas having been £1295, against £1165 last year. The outlay for coals had been much heavier this year; but the Directors hoped to be able to reduce the price of gas at Midsummer. From a balance of £845, a dividend of 8s. per share was declared. Owing to the death of Mr. G. Earl, Mr. C. Dawson (the Solicitor) has been appointed Secretary.

Sale of Stocks and Shares.—On Monday of last week, Mr. Alfred Richards carried out the instructions of the Directors of the West Ham Gas Company and offered for sale, at the Mart, Tokenhouse Yard, 2500 fully-paid ordinary £10 shares in the Company ranking for a standard dividend of 7 per cent. per annum, subject to the sliding-scale; the last dividend on similar shares having been at the rate of 6 per cent. per annum. They were readily bought at prices ranging from £11 12s 6d to £12 each; the total amount realized being £29,286. The next day, Mr. Richards sold some new ordinary stock of the Southend Gas Company (last dividend at the rate of 5½ per cent. per annum) at £112 and £112 10s. per cent.; consolidated ordinary stock of the Isle of Thanet Gas Company, at £112, £113, and £117 10s. per £100 of stock; new ordinary £10 shares in the Southend Water Company, at £11 10s. to £11 17s. 6d. apiece; some 4 per cent. perpetual debenture stock of the Company, at £114 per £100 of stock; and a parcel of fully-paid £5 shares in the Goring and Streatley District Gas and Water Company, at £1 16s. and £1 17s. 6d. each.

Carlisle Gas Committee and the Gas Workers' Union.—At the meeting of the Carlisle Town Council on Tuesday, the Gas Committee were again attacked on the question of their treatment of the workmen by refusing to receive Mr. Lynas, District Secretary of the Gas Workers' Union, with regard to the wages paid by the Committee and the hours of labour at the works. The employees at the gas-works, Mr. Collin contended, ought to be treated with courtesy and as fellow-citizens, who to some extent were partners in the concern, and not with the contempt and indifference which had been meted out to them. He moved that it be an instruction to the Gas Committee to receive Mr. Lynas without further delay. Mr. Wardle suggested that the Committee should also be instructed to pay trade wages to the men. Mr. Collin said a town's meeting had been held, presided over by one of the City Magistrates, at which a resolution was passed asking the Committee to receive Mr. Lynas; and he thought that such a resolution should be treated with respect. The Mayor said the Gas Committee had received the resolution referred to, and would reconsider the question raised at their next meeting.

Messrs. Graham, Morton, and Co., of Leeds, have received a further order for fourteen beds of inclined retorts at the Leeds Gas-Works.

The Kirkham Gas Company, Limited, have placed an order with Messrs. R. Dempster and Sons, Limited, of Elland, for complete new purifying plant.

The John Wright and Eagle Range, Limited, to enable them to cope with the demand for their stoves, and prevent delay in deliveries, have nearly doubled the size of their works.

The Kingscliffe (Northamptonshire) Gas Company, being unable to produce gas at a profit, have consulted Mr. J. Barton, of Peterborough, who has advised that new appliances are needed; the present works being quite out of date.

In the notice of the opening of the new gas-works at Scunthorpe which appeared in the "JOURNAL" last week, it should have been mentioned that the photometrical and testing apparatus was supplied by Messrs. Alexander Wright and Co., Limited.

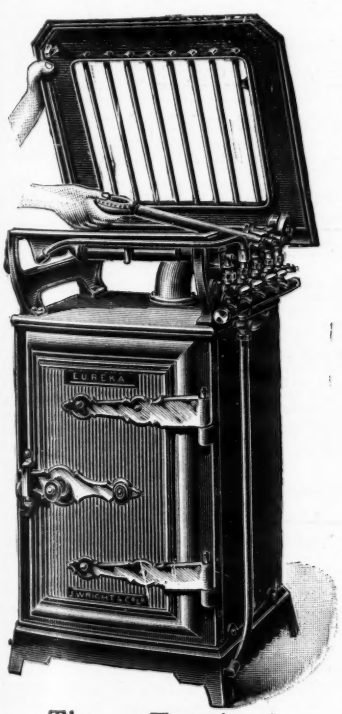
An order has just been placed with the Whessoe Foundry Company, Limited, of Darlington, for a large telescopic gasholder for Cape Town. The number of men at present employed by the Company in the works and in erecting in various parts of the kingdom is between 600 and 700; and the work now on hand amounts to nearly £200,000.

The North-Eastern Railway Company are about to dismantle their gas-works at Norton Junction, which have been supplying for many years the gas used for about 150 lights in connection with the railway system at that place; and arrangements are complete by which they will take their supply from the Corporation gas-works at Stockton.

The award has been given in a recent arbitration respecting the amount to be paid by the Clacton District Council for the compulsory acquisition of land at Great Bentley for the purposes of their new water supply. The amount is £2140. The extent of the land is 25 acres; and the total sum claimed by the owners was £12,000. The costs (which will probably be £2000) will have to be paid by the Council.

The Pulsometer Engineering Company, Limited, are issuing a small pamphlet containing a hundred "appreciations" of their well-known pump. The machine has for some years been before the world, and its performances have always evoked the highest commendation. The opinions expressed in the testimonials now presented afford evidence that the claims made for it on the score of efficiency, economy, and general utility continue to be fully justified.

In another part of the "JOURNAL" will be found the prospectus of the St. David's Water and Gas Company, which has been incorporated under an Act obtained in 1899, with a capital of £16,000 in £5 shares, Of these 1693 have been privately subscribed; and the remainder (1507) are offered at par. The water-works are already in operation; and the gas-works are to be constructed at once upon the most modern lines, with room for extensions, on freehold land. The shares rank for a dividend up to 10 per cent.; and a minimum of 4 per cent. is guaranteed during the erection of the gas-works. The list will close on or before Friday next.



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Wright's "Eureka" Gas-Cookers.

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These Improvements do not increase the cost of the Cooker.

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BIRMINGHAM, LONDON, MANCHESTER, LIVERPOOL, and BRISTOL.

The annual meeting of the shareholders of Meters Limited was held last Friday at Manchester. The Chairman (Alderman J. Miles), in moving the adoption of the report, said the year had been one of satisfactory progress. The Company had during the year felt the full force of the advanced prices in raw material. This would be better understood when he informed the shareholders that for every extra £5 paid for raw material they had only received £1 or £1 10s. back in the enhanced prices obtained for the meters. Happily matters had improved; and he looked forward to further improvement. Two or three additions had been made to the list of patents, which had resulted in an improvement in point of accuracy and workmanship of the meters manufactured, and also in economy of manufacture. The year's prospects were very favourable. The report was agreed to; and votes of thanks closed the proceedings.

In connection with the extension of the Leigh Corporation Gas-Works, to which reference was made in the "JOURNAL" for the 23rd ult. (p. 1064), Messrs. Alexander Wright and Co., Limited, have been entrusted, through Messrs. Clapham Bros., the Contractors, with the order for the testing apparatus. It includes ventilating, heating, and thermostatically regulating the photometer-room and laboratory, which are being built to the plans of Mr. J. Foster, the Gas and Electricity Engineer to the Corporation, and which are to be fitted up with a complete set of apparatus and a Harcourt table photometer, specially arranged for testing and ascertaining, by means of the tables recently copyrighted by Mr. Jaques Abady, one of the Managing Directors of the firm, the illuminating power of gases of from 14 to 20 reputed candle power, on the same system as that adopted by the Gas Referees, which is only suitable for gas of 16-candle reputed power.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

WHITSUN HOLIDAY.

In consequence of the WHITSUN HOLIDAY, Communications for the next issue of the "JOURNAL" and Orders respecting ADVERTISEMENTS should be received at the Office NOT LATER than THE FIRST POST ON SATURDAY.

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OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

PATENTS FOR INVENTIONS.

Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

BROTHERTON & CO.

Offices: Commercial Buildings, LEEDS.
Correspondence invited.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

GAS TAR wanted.

BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

HIGH-CLASS CYCLES at Reasonable and LOW PRICES. Guaranteed and sent on approval. For Cash or Gradual Payments. Catalogue post free. Old Machines Exchanged or Repaired.
MELROSE CYCLE COMPANY, COVENTRY.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

R. B. FITZ-MAURICE, 4, East India Avenue, London. Foreign and Colonial SHIPMENTS and CHARTERING promptly attended to FIRE, LIFE, and ALL CLASSES of INSURANCES effected on the Lowest Terms.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

PRACTICAL RETORT SETTERS.

GEORGE NUTTALL & CO., 32, Have- lock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., Central Plumbing Works, Victoria Square, BOLTON.

GAS Rental Clerk, &c., desires engage- ment, for climatic reasons, in Home Counties. Eighteen years' varied experience with large North Country Corporation.
Address inquiries to No. 3692, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

YOUNG Man wishes Change. Thorough Knowledge of Working and Superintending Gas Distribution Department. At present with large Suburban Gas Company.
Address No. 3696, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER, at present Manager and Secretary of Water-Works, wants position as MANAGER or MANAGER and SECRETARY, in England for choice, but of the Colonies, New Zealand preferred. Was Assistant Manager and Engineer of the Perth Gas and Electric Lighting Company, of West Australia, from 1895-1900 (Five Years), also Manager and Secretary for Four Years previously in New South Wales, with Ten Years' practical Experience in English and Australian Works, including construction from Regenerative Settings to Consumers Burners, with practical and theoretical knowledge of Carburetted Water-Gas Manufacture, being the first in the Colonies to have charge of such. Holder of First and Second Class Certificates in Ordinary and Honours in City of London Guilds Examinations and Chemistry—Sydney and Perth Technical Colleges. Resigned entirely of own accord. Can produce unexceptional References as to Character and Ability.
For further Information and *copies* of References, &c., apply to H. HOARE, care of Mr. W. King, 11, Bolt Court, FLEET STREET, E.C.; or H. HOARE, Gas Engineer, Cotteslow, near Perth, WEST AUSTRALIA.

WANTED, at once, for a Provincial Gas Company, a practical GAS-FITTER to act as FOREMAN, capable of superintending laying Services, &c., fixing, &c., Gas-Stoves, Fitting up Houses, and any Work in connection with the Outside Department of a Gas Company.
Apply, by letter, stating Age, Wages required, and References, to No. 3694, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

OXIDE OF IRON OF FINEST QUALITY.

BALE'S Special Fire Cement should be used to keep Retorts, Furnaces, &c., in good repair during the heavy Winter Work.
Send for full Particulars to
BALE & CO., 120 & 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."
Telephone "277 HOLBORN."

GAS Fitters' Improver Wanted. State Age and Wages, with References.
Apply to the MANAGER, Gas-Works, Ringwood, HANTS.

WANTED, by the Aldershot Gas and Water Company, MAIN and SERVICE LAYER (Spigot and Socket Pipes). Steady, reliable Man. 6d. per hour.
Apply to the SECRETARY.

WANTED, for a medium-sized Works near London, a STORE and TIME KEEPER Must have had Experience. Age not to exceed 35.
State Wages required, and give Particulars of Employment, &c., to No. 3695, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, immediately, for a Term of Two Months, a first-class MAIN LAYER, well experienced in the laying of large Gas-Mains.
Apply, by letter, stating Experience and Wages required, not later than Saturday, May 25, 1901, to F. PATERNOSTER, Gas Engineer, FELIXSTOWE.

MECHANIC and Blacksmith wanted, willing to make himself generally useful on the Works. Applicants must have had experience in an Engineer's Workshop.
State previous Employment, Age, Wages required, and enclosing *copies* of Testimonials, to A. E. LAYTON, Manager, Gas-Works, REDDITCH.

PORTSEA ISLAND GASLIGHT COMPANY, FLATHOUSE WORKS.

WANTED, a Works Superintendent.
Must be thoroughly conversant with the Manufacture of Coal and Carburetted Water Gas and Purification. Also the working of Stoking Machinery, Regenerative Firing, and the control of Workmen. Annual make about 950 million cubic feet. Salary £200 per annum, increasing by £10 per year to £230. House (only). Age between 30 and 40.
Applications, with *copies* of not more than three Testimonials, to be sent to the Chairman of the Company not later than June 1 and endorsed "Works Superintendent."

J. D. ASHWORTH,
Engineer.

Engineer's Office, Gas-Works,
Portsmouth.

URBAN DISTRICT OF ASHTON-IN-MAKERFIELD.

APPOINTMENT OF GAS MANAGER.

THE Urban District Council of Ashton- in-Makerfield invite APPLICATIONS for the position of MANAGER of their Gas-Works.
Applicants must be thoroughly competent Men, and have a practical knowledge of the Manufacture of Gas and Residuals, and the erection of Gas-Works Buildings. The present Annual Make of Gas is about 18 Million cubic feet.
The person appointed will be required to devote the whole of his time to the duties of the Office. Commencing Salary £130 per annum.
Applications, stating Age, present or past Employment, accompanied with *copies* of not more than three Testimonials, to be forwarded to me, the undersigned, not later than the 1st of June next, endorsed "Application for Manager."
Canvassing the Members of the Council either directly or indirectly will be deemed a disqualification.

ALBERT SYKES,
Clerk to the Council.

Council Offices, Ashton-in-Makerfield,
May 16, 1901.

FOREMAN FITTER.

WANTED, by a First-Class Man, a Situation as FOREMAN of Gas-Fitters, experienced in estimating. Energetic and obliging. Aged 32. Married. Could take entire charge of Fittings Department. Exceptional References. Correspondence invited. At liberty immediately.

Address No. 3693, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Country Stoker, who can lay a Service and fix a Meter if required.

Particulars and Wages asked to the MANAGER, Gas-Works, Alresford, HANTS.

FOREMAN RETORT SETTER WANTED.

CONTRACTOR requires a good Foreman RETORT SETTER, who has had experience with Inclined Retorts. Must have good command of Men, and be able to start at once.

Apply, stating Age, Wage, and Experience, to No. 3691, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HIGH WYCOMBE GASLIGHT AND COKE COMPANY, LIMITED.

WANTED, by the above-named Com- pany, a Competent WORKS FOREMAN, having Mechanical knowledge, and accustomed to Regenerative Settings, and the usual Plant appertaining to Works of 60 millions Capacity.

Wages £2 per week; also House and Firing free.

Applications to the undersigned, from whom further Particulars are available upon aplication.

J. FRED. WICKS, C.E.,
Engineer and Secretary.

GAS-WORKS MANAGER.

THE Directors of a fast increasing Works in England, at present making over 200 million cubic feet per annum, require a competent Man who would devote himself to the economical management of their business. He must have Engineering Knowledge to Design, Specify, Estimate, and carry out modern Apparatus and Buildings of Gas-Works, and be a fair Chemist, able to apply and work out Tests of Gas and Residuals. Possible Candidates (whose communications if desired will be kept private) are invited to send Particulars of the capacity of the Works they are now engaged in, the make of Gas per ton and per mouthpiece, the percentage of Fuel used per ton of Coke made, together with class of Furnaces in use. They will also state approximate Age and whether Married. Communications with those first selected will subsequently embrace the questions of Certificates, Salary, &c., &c.

Address not later than the 25th of May current, No. 3687, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Gas-Works on Lease or Purchase, by thoroughly practical Gas Engineer. Address No. 3665, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, immediately, the following Second-Hand GAS PLANT, in good order:—

PURIFIERS, equal to from 9 to 12 feet square.
CONDENSERS. SCRUBBER-WASHER.
STATION METER and GOVERNOR, with Connections, about 8-inch bore.
GASHOLDER, with or without Iron Tank, from 35 feet to 70 feet diameter.
Suitable Connections and Pipes for the above.

GEORGE TERRIS,
Secretary.
Cowdenbeath Gaslight Company, Limited, Fife.

OFFERS, before the 31st inst., with Plans and full Particulars, for the following:—

1. RETORT-HOUSE IRON ROOF, new or good second-hand, 35 to 50 feet span.
2. RETORT-BENCH of Fire-Brick, Piers and Back Walls 18 inches thick, Arches 14 inches, to contain one Oven of Six Retorts and one of Three; Foundation prepared.
3. REGENERATORS, about 6 ft. 6 in. deep, and nine Ω-shaped RETORTS set in the above.
4. Steel JOIST BINDERS, Steel HYDRAULIC MAIN, Ω-shaped, 24 inches diameter. Self-Sealing MOUTHPIECES, ASCENSION-PIPES, 7 in. to 6 in. BRIDGE and DIP PIPES.
5. PRODUCER FEEDING and CLEANING DOORS.

NOTE.—Second-hand Ironwork acceptable if modern and good.

GEORGE TERRIS,
Secretary.
Cowdenbeath Gaslight Company,
Limited, Fife.

FAVERSHAM GAS COMPANY.

FOR SALE—A Set of Four 10 ft. square PURIFIERS, with Centre-Valve, 10-inch Connections and Lifting Gear complete, by C. & W. Walker, Limited.

Further Information upon application to the COMPANY'S ENGINEER, Gas-Works, FAVERSHAM.

TO BE SOLD—

SINGLE GASHOLDER, 30 ft. by 10 ft. Five Columns.
SINGLE GASHOLDER, 22 ft. by 10. ft. Four Columns.
SIX DONKEY PUMPS, various sizes to 20-horse power.

Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY Gas Engineer, Thornhill, DEWSBURY.

FOR IMMEDIATE SALE.

OWING to the Introduction of Elec- tricity for the Public Lighting, the Sleaford Gas Company, Limited, have FOR SALE, 137 LAMP COLUMNS, BRACKETS, and COPPER LANTERNS. Many of the Lanterns are practically new, fitted with No. 4 Kern Burners, Auto-Taps, and Anti-Vibrators. Also One Large LAMP COLUMN, fitted with Arc Lamp and Three No. 4 Kern Burners, complete.

For Photos, Prices, &c., apply to H. WIMHURST, Engineer and Manager, Gas-Works, SLEAFORD.

CITY OF CARLISLE.

THE Carlisle Gas Committee are pre- pared to receive TENDERS for the supply of COAL and CANNEL required at their Works during One Year from the 1st of July next.

Tenders, endorsed "Coal," to be delivered not later than June 1, 1901.

Forms of Tender and other Particulars on application.

C. B. NEWTON,
Engineer and General Manager.
Gas-Works, Carlisle,
May 17, 1901.

CITY OF CARLISLE.

THE Carlisle Gas Committee are pre- pared to receive TENDERS for the purchase of the surplus TAR produced at their Works for a period of One Year from the 1st of July next.

Tenders, endorsed "Tar," to be delivered not later than June 1, 1901.

Further Particulars can be obtained on application.

C. B. NEWTON,
Engineer and General Manager.
Gas-Works, Carlisle,
May 17, 1901.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Leek Urban District Council invite TENDERS for the supply of Best Screened GAS COAL, Washed NUTS, and CANNEL for Six or Twelve Months from the 1st of July, 1901, to be delivered at the Leek Station on the North Staffordshire Railway.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Leek, not later than Saturday, the 1st of June, 1901.

By order,
C. HENSHAW,
Clerk of the Council.
Town Hall, Leek,
May 18, 1901.

TO TAR DISTILLERS AND OTHERS.

THE Leek Urban District Council invite TENDERS for the purchase of the Surplus TAR produced at their Gas-Works for One, Two, or Three Years from the 1st of July, 1901, at per ton of 2240 lbs.

Also for the AMMONIACAL LIQUOR produced at such Works for like periods, but the Council do not bind themselves to sell this product.

Further Particulars may be obtained from the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee to be delivered at the Town Hall, Leek, not later than Saturday, the 1st of June, 1901.

By order,
C. HENSHAW,
Clerk to the Council.
Town Hall, Leek,
May 18, 1901.

CANTERBURY GAS AND WATER COMPANY.

TO IRONFOUNDERS.

TENDERS are invited for the supply of 50 12-inch CAST-IRON turned and bored Socket and Spigot PIPES, 12 feet lengths, 8 cwt. each, also certain SPECIAL CASTINGS.

A Specification and Particulars may be obtained of the undersigned at the Company's Offices, Castle Street, Canterbury.

JAMES BURCH,
Secretary and General Manager.
May 13, 1901.

ELSECAR, WENTWORTH, AND HOYLAND GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 1000 to 3000 Tons of GAS COAL, screened or unscreened, for Twelve Months. Price per Ton of 20 cwt. (*plus* 2 cwt. for Wastage) at the Pit to be given, also Price delivered at Elsecar Stations, Great Central and Midland.

Tenders to be sent to the undersigned not later than the 31st inst., endorsed "Tender for Coal."

ALBERT F. HALL,
Secretary.
Platts Common, near Barnsley,
May 17, 1901.

DRIFFIELD URBAN DISTRICT COUNCIL.

TO GASHOLDER MAKERS.

THE above Council invite Tenders for the supply and erection of a 200,000 Cubic Feet GASHOLDER, and a STEEL TANK to contain same; also for 10-inch CONNECTING-MAINS.

Specifications and Drawings may be seen at my Office, Driffield.

Tenders, to be addressed to me, endorsed "Tender for Gasholder," and sent in on before the 30th of May, 1901.

The lowest Tender will not necessarily be accepted.

By order,
GEO. B. TONGE,
Clerk to the above Council.
Great Driffield,
May 15, 1901.

TENDERS FOR GAS COAL.

THE Directors of the Watford Gas and Coke Company invite TENDERS for the supply during the Twelve Months from the 1st day of July, 1901, to the 30th day of June, 1902, of 9000 Tons (more or less) of GAS COAL, screened or unscreened, to be delivered at the Bushey Station of the London and North-Western Railway.

Forms of Tender and all Information may be obtained, on application in writing only, of me the undersigned.

Tenders to be delivered on or before the 10th day of June, 1901, addressed to the Chairman of the Watford Gas and Coke Company, Watford, endorsed "Tender for Gas Coal."

Tenders must be on the Form supplied, any alteration of which will invalidate the Tender.

The Directors do not bind themselves to accept any Tender.

J. DUNCAN ROYAL,
Secretary.
Watford Gas and Coke Company's Offices,
Watford, May 10, 1901.

RAMSGATE CORPORATION.

(GAS, WATER, AND ELECTRICITY DEPARTMENT.)

THE Gas, Water, and Electricity Com- mittee invite TENDERS for the supply of best quality, soft caking, and gas-producing screened DURHAM or OTHER COAL in three annual quantities of 21,000, 22,000, and 23,000 Tons, delivered free into Carts on the Quay of Ramsgate Harbour. The first quantity of 21,000 Tons to be delivered in equal monthly quantities between the 1st of July, 1901, and the 30th of June, 1902; the second and third years supplies also in equal monthly quantities between the 1st of July, 1902, and the 30th of June, 1903, and the 1st of July, 1903, and the 30th of June, 1904. A distinct price to be named for each annual quantity.

Tenders to be sent in not later than Saturday, June 1, addressed to the Chairman of the Gas, Water, and Electricity Committee, Boundary Road, Ramsgate, endorsed "Coals."

The Committee do not bind themselves to accept the lowest or any Tender.

Full Particulars and Form of Tender on application to

WILLIAM A. VALON,
Engineer.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

TO PIPE FOUNDERS.

THE Gas Commissioners are prepared to receive TENDERS for the supply and delivery of 30-inch diameter CAST-IRON MAIN PIPES, CONNECTIONS, and SPECIALS, at their new Gas-Works, Granton, near Edinburgh.

Specifications, Schedules, and Forms of Tender may be obtained upon application to the Chief Engineer and Manager, Mr. W. R. Herring, Gas-Works, New Street, Edinburgh.

Tenders to be lodged with the undersigned on or before Monday, the 27th day of May, 1901, at Ten a.m., endorsed "Tender for Main Pipes."

The Commissioners do not bind themselves to accept the lowest or any Offer.

JAMES M'G. JACK,
Clerk.
25, Waterloo Place, Edinburgh,
May 7, 1901.

BOROUGH OF DARWEN.

THE Corporation are prepared to re- ceive TENDERS for all the surplus GAS TAR produced at their Gas-Works for One Year.

Also for the supply of the following GOODS for One Year:—

1. OILS and PAINTS.
2. VITRIOL.
3. WROUGHT-IRON TUBES and FITTINGS.
4. BRASS FITTINGS.
5. LEAD PIPE.
6. GAS-METERS.

Particulars as to quantities may be obtained on application to Mr. A. H. Smith, Gas Engineer, Darwen.

Sealed and endorsed Tenders must be delivered to the undersigned at or before noon on Thursday, May 23.

No Tender necessarily accepted.

By order,
WILLIAM P. HALLIWELL,
Town Clerk.
Town Clerk's Office,
May 7, 1901.

GLOUCESTER GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 33,000 Tons of GAS COAL for One Year from the 1st day of July next, in such monthly quantities as may be required by the Company.

Tenders to state the price delivered at the Midland Railway Sidings, Hempsted, near Gloucester, or the Great Western Railway Wharf, Llanthony, Gloucester; or if sent (as preferred) by Water, the price f.o.b., and also the price delivered at the Gas Company's Wharf on the Gloucester and Berkeley Canal.

Further Particulars and Forms of Tender may be obtained of the undersigned.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than the 4th day of June next.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM E. VINSON,
Secretary.
Gas Offices, Gloucester,
May 2, 1901.

4 PER CENT. MINIMUM DIVIDEND GUARANTEED.

CONSTRUCTION OF GAS-WORKS.

The St. David's Water and Gas Company.

Incorporated by the St. David's Water and Gas Act, 1899.

CAPITAL

£16,000, in 3200 Shares of £5 each,

Of which 1693 have been privately subscribed.

ISSUE OF THE BALANCE AT PAR—viz.,

1507 ORDINARY SHARES OF £5 EACH

Ranking for Dividend up to Ten per Cent. per annum,

A Minimum Dividend of Four per Cent. is guaranteed from date of payment until the 12th day of April, 1903.

PAYMENTS—£1 per Share on Application.

£1 ,, Allotment.

And the Balance at intervals of Two Months.

THE LIABILITY ON THE SHARES IS LIMITED TO £5 PER SHARE.

The Borrowing Powers are limited by Section 8 to one-fourth of the Capital raised.

BANKERS:

LLOYDS BANK, Limited, St. David's, Pembrokeshire.

The List will OPEN on TUESDAY, the 21st day of MAY, and CLOSE on or before FRIDAY, the 24th of May, 1901.

ABRIDGED PROSPECTUS.

THE Directors give notice that they are prepared to receive APPLICATIONS at par for 1507 SHARES of £5 each, ranking for dividend up to 10 per cent., being the balance of the Company's authorized capital under section 6 of the St. David's Water and Gas Act.

The issue is made for the purpose of constructing the authorized gas-works (the Freehold site for which the Company have agreed to purchase), and for laying the gas-mains in the principal thoroughfares of St. David's and for other purposes. The Company's Pumping Station and Reservoir are completed and mains laid, and St. David's is now being supplied with water. A plan showing the sites of the water and gas works, also reservoir, mains, &c., is enclosed in prospectus.

The position of the City of St. David's and district is likely to be considerably improved owing to the very important harbour and other works which the Great Western Railway Company are carrying out at Goodwick and Fishguard, in connection with the important new short route from London to the South of Ireland.

Under the Company's Act, Section 19:

"The limits of this Act for the supply of water and gas shall be the City of St. David's, the Cathedral Close, and the Parishes of St. David's and Whitchurch, in the County of Pembroke."

The Company's Act of Parliament received the Royal Assent on the 6th of June, 1899, and authorizes the supply of water and gas to the City of St. David's and adjacent places. The preamble of the Bill states:

"Whereas there is no proper or adequate supply of water or gas to the City of St. David's, in the County of Pembroke, and other parishes and places in that County adjacent thereto."

The water supply of St. David's has hitherto been of the most primitive character, and in the case of a large number of houses the water is brought in buckets from an outside well. The City in the past has been lit with oil-lamps; St. David's, therefore, offers a good opening for a water and gas undertaking.

The Directors feel satisfaction in pointing out the progress that has been made with the Company's works. There is no doubt, in their opinion, that a small Gas and Water Company where economy in administration will result, offers a sound opportunity for investment. In the present instance a minimum dividend of four per cent. per annum is guaranteed until the 12th April, 1903; the maximum authorized statutory dividend being 10 per cent. per annum.

An excellent supply of water has been obtained from a site known as Nine Wells, situated about half-way between St. David's and Solva. The purity of the water is testified to by Mr. Otto Hehner, Public Analyst for Nottinghamshire, who, in his report on the sample received, states:

"In its present condition the water is perfectly well suited for all domestic purposes; its great organic purity and its low hardness indicating it as fit for drinking, cooking, and washing."

The Company's service reservoir has a capacity of 60,000 gallons, and from this St. David's is now being supplied. This site and those of the pumping-station and gas-works are freehold. The pumps and plant have been supplied by the well-known firm of James Simpson & Co, Limited, Grosvenor Road, London.

The price of coal at St. David's being high, an important feature of the Company's business will be the supply of Cookers and Stoves on the "Slot" system, which has proved so successful with other companies. Arrangements are being made to hold a Gas Cooking Exhibition for the Sale or Hire of Cookers and Stoves.

The Company's Gas-Works will be immediately constructed, the mains laid, and the work carried out on modern lines, with spare retort-house room for increasing the capacity. The plant throughout is designed to admit of easy extension. It is proposed to build a Manager's house in connection with the works, also a workshop, stores, &c. The site for the gas-works is situate at one of the lowest levels in the district, and is very favourable for gas manufacture. A landing wharf adjoins the works, thus affording good facilities for carriage.

As an illustration of the value of Water and Gas Companies' Investments, the following is a list of some premiums at which these shares stand:—

	Present Div. per cent.	Nom. Value per Share.	Present Price per Share.	Prem. per cent.
Ferndale Gaslight and Coke and Water Works Co., Ld.	10	£5	£8 2/6	62 10/-
Launceston Gas Co., Ld.	7	£5 (£4 paid)	£7 10/-	87 10/-
Wells Water Co., Ld.	10½	£5	£12 10/-	150
Monmouth Gas & Water Co., Ld.	10	£10	£20	100
Pembroke Dock & Town Gas Co.	5	£10	£12	20
Tenby Gas Consumers' Co., Ld.	6½	£10	£13	30

Prospectuses and Forms of Application may be obtained at the Company's offices, St. David's, Pembrokeshire; or of their Bankers, Lloyds Bank, Limited, St. David's, Pembrokeshire; the Head Office, Lombard Street, London, E.C., and other Branches. Where no allotment is made, the deposit will be returned in full, and in case of a partial allotment the balance of the deposit will be applied towards the subsequent instalments.

DIRECTORS.

RICHARD BARNES, Director of The Wetherby District Water Company and The Crowborough District Gas Company (Chairman).

Charles Hibbert Binney, Director of the North Pembrokeshire Water and Gas Company.

Frederick Miller, Director of The North Warwickshire Water Company.

William Bentham Martin, Director of the Cobham Gas Company.

AUDITORS.—Messrs. W. B. Keen and Co., 3, Church Court, Old Jewry, E.C. (Chartered Accountants).

BANKERS.—Lloyds Bank, Ltd., St. David's, Pembrokeshire.

MANAGER and SECRETARY.—A. T. Cull.

COMPANY'S OFFICES.—St. David's, Pembrokeshire.

May 2nd, 1901.

THE Directors of the Kildwick Parish Gas Company invite TENDERS for the supply of the whole or part of 4500 Tons of GAS COAL or NUTS, to be delivered free in the Company's Siding at Kildwick during the Twelve Months ending June 30, 1902.

Tenders to be sent in not later than June 1, 1901, to

FRED. H. PICKLES,
Manager and Secretary.

Gas-Works, Kildwick,
May 17, 1901.

PERTH CORPORATION.

(GAS DEPARTMENT.)

MATERIALS AND GAS MANUFACTURING PLANT FOR SALE.

OFFERS are invited for the following MATERIALS and GAS MANUFACTURING PLANT belonging to the Town Council of Perth—viz.,

RETORT-HOUSE ROOF—Corrugated Iron Roof, 110 feet long by 60 feet span, in splendid condition.

IRONWORK of 22 Beds of five Retorts each, including Self-Sealing Lids, 20 inches by 12½ inches, Ascension-Pipes, Bridge and Dip Pipes, 6 inches diameter.

HYDRAULIC MAIN, in Wrought-Iron, 25 inches by 25 inches section; Buckstaves, Producer and Clinkering-Doors, Fire-Bars, &c.

CONDENSERS—Cast-Iron Wall Condenser, comprising 600 lineal feet of 14-inch diameter Pipes, complete with Bends, Valves, &c. Wrought-Iron Wall Condenser, comprising 700 lineal feet of 14-inch Pipes, complete with Valves, Inspection Ends, &c.

SCRUBBERS—Four Wrought-Iron Scrubbers, each 25 feet long by 5 feet diameter, erected in pairs, Cast-Iron Tank at base, ornamental cornice moulding at top, complete with Valves, Connections, &c. Young Scrubber-Washer and Storage Tank above, 5 feet diameter by 18 feet in height inclusive, with four working Trays.

PUMPS—Battery of Nine Power Pumps, ranging from 1¼ inches to 4 inches diameter, with Shafting complete, and all in first-rate working condition.

BOILER—Cornish Boiler, 20 feet long by 6 feet diameter (with 3 ft. 3 in. Flue fitted with Meldrum Blower), insured to Working Pressure of 75 lbs.

PURIFIERS—Four Purifiers, 20 feet by 14 feet, complete with Valves, Connections, Grids, &c.

SULPHATE PLANT—Boiler Still, Saturator, Battery Condenser and Purifier, capable of producing one ton of Sulphate per day.

GASHOLDER COLUMNS—Six Columns and Girders. Working length of column 45 ft. diameter, at base 2 ft. 3 in. diameter, at top 1 ft. 7 in., thickness of Metal ⅜ inch.

Quantity of CHARGING BARROWS and SUNDRY MATERIAL.

One Old BOILER TANK, 27 ft. long by 7 ft. diameter.

One EGG-END BOILER TANK, 14 ft. long by 5 ft. diameter.

For further Particulars, apply to W. B. M'LUSKY, Engineer and Manager, New Gas-Works, PERTH; and Offers to be sent to JOHN BEGG, Esq., Town Clerk, PERTH.

PRESCOT GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the surplus TAR produced at their Works during the Twelve Months ending May 31, 1902.

Tenders to be sent to the undersigned on or before the 1st of June, 1901, endorsed "Tar."

The estimated Quantity is about 180 Tons.

JOHN E. HALL,
Engineer and Manager.

FARNWORTH AND KEARSLEY GAS COMPANY.

THE Directors of the Farnworth and Kearsley Gas Company are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their Works, together or separately, for One or Two Years.

Sealed Tenders, addressed to the Chairman, J. W. Watkinson, Esq., to be delivered on or before Wednesday, the 5th of June.

Forms of Tender or any further Information required may be obtained from the undersigned.

THOMAS LEA SHEPPARD,
Manager.

ACCRINGTON DISTRICT GAS AND WATER BOARD.

THIS Board invite Tenders for the sur- plus TAR and AMMONIACAL LIQUOR which may be produced at the Accrington and Great Harwood Works of the Board, during the Year from the 1st of July next to the 30th of June, 1902. The estimated quantity of Tar is 1800 Tons, and Liquor 5000 Tons.

Sealed Tenders, endorsed "Tar and Liquor," addressed to the Chairman of the Board, must be in my hands on or before Friday, the 7th of June.

Form of Tender may be obtained on application,

By order,
CHARLES HARRISON,
General Manager.

General Offices, Accrington,
May 10, 1901.

BOROUGH OF CLITHEROE.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee invite Tenders for the supply of 3000 Tons of screened GAS COAL and 1500 Tons of SLACK, to be delivered during the Year ending May 31, 1902.

Further Particulars and Form of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Gas Coal," addressed to the Chairman of the Gas Committee, to be delivered at my Office, on or before Tuesday, the 4th of June, 1901.

ROBT. BARRETT,
Manager.

Gas-Works, Clitheroe,
May 15, 1901.

COUNTY BOROUGH OF WEST BROMWICH.

(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the supply and delivery of about 1200 yards of 8-inch CAST-IRON PIPES, together with the necessary SPECIAL CASTINGS.

Specification and Form of Tender may be had upon application to Mr. Thomas Glover (Manager) at the Gas-Works, West Bromwich.

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders to be sent in addressed to me not later than Twelve o'clock noon, the 29th inst.

By order,
THOMAS HUDSON,
Secretary.

Town Hall, West Bromwich,
May 14, 1901.

URBAN DISTRICT OF ASHTON-IN-MAKERFIELD.

TENDERS FOR COAL AND CANNEL.

THE Ashton-in-Makerfield Urban Dis- trict Council invite TENDERS for the supply of 2000 Tons of COAL and 250 Tons of CANNEL, from the 1st of July, 1901, to the 30th of June, 1902, to be delivered at such times and in such quantities as required. The Council reserve to themselves the right to make the Contract for half quantity, for Six Months, or continue for the whole period.

Forms of Tender and other Information may be obtained upon application, from the undersigned.

Tenders, endorsed "Gas," to be delivered to me on or before the 1st of June, 1901.

The lowest or any Tender not necessarily accepted.

ALBERT SYKES,
Clerk.

Council Offices, Ashton-in-Makerfield,
May 16, 1901.

BELPER GAS AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors are prepared to receive TENDERS for the supply at their Works, situate near the Railway Station, Belper, of 2000 Tons (more or less) of GAS COAL (part in the Gas Company's own waggons); also about 200 Tons (more or less) of CANNEL COAL, to be delivered at such times, and in such quantities, as the Directors or their authorized servants shall from time to time order.

Sealed Tenders, stating price per Ton and Information as to the quality and quantity of Gas the Coal is estimated to produce, also as to where the same is now in use, to be sent to the undersigned, on or before Friday, the 7th of June.

The Directors do not bind themselves to accept the lowest or any Tender, nor to take the whole of the above quantities of Coal or Cannel.

By order,
JOSEPH PYM,
Managing-Director.

Belper, May 15, 1901.

THE Widnes Corporation are prepared to receive TENDERS for the supply of about 25,000 Tons of GAS COAL (Slack "Through and Through" or Screened Coal), for the period ending the 30th of June, 1902, to be delivered at the Gas-Works, Widnes.

Conditions and Forms of Tender may be obtained from Mr. I. Carr, M.Inst.C.E., Gas Engineer, Widnes.

Tenders, endorsed "Gas Coal," to be delivered to the undersigned not later than by the first post on Monday, the 3rd of June prox.

The Corporation do not bind themselves to accept the lowest or any Tender.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes,
May 15, 1901.

THE Directors of the Staines and Egham Gas Company invite TENDERS for the supply and delivery of about 100,000 Gallons of SOLAR DISTILLATE for Gas-Making Purposes (Specific Gravity between 850 and 885, Flash-Point not less than 150) for One Year commencing from July 1, 1901.

The Contractor to state Price per Gallon, delivered alongside the Company's Wharf situate at Egham, and to be delivered at such times and in such quantities as may be ordered by the Company's Manager.

Any other Information may be obtained of the undersigned.

Sealed Tenders to be sent to J. A. Engall, Esq., Clarence Street, Staines, on or before the 3rd day of June, 1901.

The Directors do not bind themselves to accept the lowest or any Tender.

THOS. WEBB,
Manager.

PETERBOROUGH GAS COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company invite TENDERS for the supply of best screened GAS COAL and CANNEL for One Year, commencing the 1st of July next.

Form of Tender and Conditions may be obtained on application to the undersigned.

Tenders to be sent in by the 8th of June next, endorsed "Coal," and addressed to the Chairman of the Company.

The Directors do not bind themselves to accept the lowest or any Tender.

JOHN BARTON,
Secretary and Manager.

Gas-Works, Peterborough,
May 14, 1901.

TENDERS FOR COAL.

THE Directors of the Isle of Thanet Gas Company are desirous of receiving TENDERS for the supply of good DURHAM GAS COAL, for One, Two, or Three Years (Second and Third Years at the option of the Company), to be delivered into the Company's Works at Margate; the quantities being as follows—viz., First Year, 26,000 Tons; Second Year, 28,000 Tons; and Third Year, 30,000 Tons.

Sealed Tenders, endorsed "Tender for Coal," to be addressed to the Chairman, and to be sent in not later than Thursday morning, June 13, 1901.

Forms of Tender can be had on application, and any further Particulars will be supplied by the Company's Engineer, Mr. James Dougall.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
THOS. C. FULLER,
Secretary.

Company's Offices: The Dane,
Margate, May 17, 1901.

BOROUGH OF WALSALL.

TO PAINTERS AND OTHERS.

THE Corporation of Walsall invite TENDERS for the PAINTING required to be done to parts of four GASHOLDERS, and also to the OUTSIDE IRONWORK and WOODWORK of Buildings at the Gas-Works, Walsall, in accordance with the Specification and Conditions prepared by Mr. B. W. Smith, the Gas Engineer to the Corporation, which may be seen on application at the Pleck Gas-Works, Walsall.

Tenders, sealed, and endorsed "Tender for Painting Gas-Works," are to be sent to the undersigned on or before Monday, the 3rd day of June next.

The Corporation do not bind themselves to accept the lowest or any Tender; and they will not accept the Tender of any Person or Firm paying less than the Standard Rate of Wages current in the District.

By order,
JOHN R. COOPER,
Town Clerk.

Borough Offices, Walsall,
May 17, 1901.

THE Llandudno Urban District Council invite TENDERS for the supply of 6000 Tons of BEST SCREENED GAS COAL, capable of producing a minimum of 10,000 cubic feet of 18-Candle Gas per ton, to be delivered, carriage paid, between the 1st of July next and the 30th of June, 1902, at the Llandudno Station of the London and North-Western Railway in such quantities and at such periods as may be ordered from time to time.

Forms of Tender may be obtained on application to the undersigned; and only such Tenders as are upon the prescribed Form will be considered.

In every case where the Particulars asked for are not given, the Tenders will be thrown out and not considered.

Tenders must be sent to the undersigned not later than the 4th day of June next.

The Tender of any Person or Firm, who personally, or through an Agent, canvasses any of the Officers or Members of the Council will be rejected.

The Council do not bind themselves to accept the lowest or any Tender.

(Signed) ALFRED CONOLLY,
Clerk to the Council.

May 17, 1901.

CANNOCK, HEDNESFORD, AND DISTRICT GAS COMPANY, LIMITED.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of about 3000 Tons of best Screened GAS COAL during the ensuing Year.

Further Information and Forms of Tender may be obtained on application to the undersigned.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman, to be sent in not later than Monday, June 10, 1901.

The Directors do not bind themselves to accept the lowest or any Tender.

T. A. NICHOLLS,
Secretary.

Gas-Works, Cannock.

BOROUGH OF TORQUAY.

THE Gas-Works Committee of the Torquay Town Council are prepared to receive TENDERS for the supply of 1200 Tons of approved GAS COALS, delivered free into Stores at the St. Mary Church Gas-Works.

Further Particulars and Forms on which Tenders must be submitted may be obtained at my Office.

Sealed Tenders, endorsed "Tender for Gas Coals," to be sent to the undersigned not later than 9.30 a.m., on Thursday, May 23, 1901.

The lowest or any Tender will not necessarily be accepted.

FREDK. S. HEX,
Town Clerk.

Town Hall, Torquay,
April 30, 1901.

THE Directors of the Witham Gaslight and Coke Company, Limited, invite TENDERS for not exceeding 1000 Tons of screened GAS COAL, to be delivered at Witham Station between the 1st of July, 1901, and the 30th of June, 1902, in such quantities and at such times as may be required.

The Coal must be freshly wrought, clean, and free from Pyrites and Bats.

Tenders must state the Price per Ton, delivered as above, and be sent to the undersigned on or before the 31st of May inst.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
F. P. BAWTREE,
Secretary.

Witham, Essex,
May 17, 1901.

TENDERS FOR GAS COAL.

THE Magistracy of Copenhagen are prepared to receive TENDERS for the supply and delivery of 90,000 Tons of best GAS COAL from medio June, 1901, until the end of December, 1901.

The Magistracy reserve the right to divide the Contracts between two or more Contractors.

Further Information and Conditions for the delivery may be obtained on application to Kobenhavns Belysningsvæsen, Vestre Boulevard, Kobenhavn B.

The Tenders, sealed and marked "Tilbud paa Kul," to be sent to Magistratens, 4de Afdeling, Lavendelstrode 1, Kobenhavn K, before the 29th of May, 1901, Twelve o'clock, at which time the Tenders will be opened in the presence of the parties tendering who are in attendance.

THE MAGISTRACY OF COPENHAGEN.

May 10, 1901.

TUNBRIDGE WELLS GAS COMPANY.

TENDERS FOR COAL.

THE Directors of the Tunbridge Wells Gas Company are prepared to receive TENDERS for the Supply of 16,000 Tons of good, clean, unscreened GAS COAL, to be delivered free into the Gas Company's Siding on the South Eastern and Chatham Railway, at Tunbridge Wells, in accordance with the Terms and Conditions which may be obtained on application.

The Tenders to be sent to me not later than Six o'clock p.m., on Tuesday, the 11th day of June, marked "Tender for Coal."

The lowest or any Tender will not necessarily be accepted.

By order,
ANDREW DOUGALL,
Engineer and General Manager.

Gas Company's Office:
44, High Street, Tunbridge Wells,
May 20, 1901.

MANSFIELD CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL AND CANNEL.
TENDERS FOR TAR AND AMMONIACAL LIQUOR.

COAL.

THE Gas Committee are prepared to receive TENDERS for 2000 Tons of CANNEL and 8500 Tons of best screened GAS COAL, delivered at Mansfield Station, for One Year from the 1st of June, 1901, to the 31st of May, 1902.

TAR AND LIQUOR.

TENDERS for surplus TAR and LIQUOR made during the Year, from the 1st of July, 1901, to the 30th of June, 1902. Tenders for Liquor to be made either at a fixed price per Ton or on the Sliding-Scale regulated by the price of Sulphate.

Tenders, endorsed "Coals" or "Tar and Liquor," as the case may be, to be sent to J. Harrop White, Esq., Deputy Town Clerk, Mansfield, on or before the 28th of May, 1901.

Particulars and all other Information from the undersigned.

No special Form of Tender provided.

The Committee do not bind themselves to accept the lowest or any Tender.

ARTHUR GRAHAM,
Engineer and Manager.

Gas-Works, Mansfield,
May 15, 1901.

FARNHAM GAS COMPANY.

THE Directors of the above Company invite TENDERS for the supply of 3000 Tons of good, clean, fresh-worked GAS COAL (screened and unscreened), delivered at Farnham Station (L. & S. W. Railway), in such quantities, and at such times, as required during the Year ending April 30, 1902.

Forms of Tender may be obtained on application.

Tenders, endorsed "Coal," to be delivered to the undersigned not later than the 1st of June next.

S. J. SYMONDS,
Manager and Secretary.

Gas-Works, Farnham,
May 13, 1901.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO ENGINEERS AND IRONFOUNDERS.

THE Directors of the above Company invite TENDERS for the Supply and Erection at their Neepsend Works of a CANNEL BREAKER and ELEVATOR, with Conveyor, Engine, Hoppers, &c., complete.

Drawings may be seen, and Specification with Form of Tender obtained, on and after Thursday, May 23, from the Engineer, Mr. J. W. Morrison, at the Company's Offices, Commercial Street.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Cannel Breaker," must be delivered (by post) to the undersigned not later than the first post on Thursday, June 6, 1901.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
May 17, 1901.

HOYLAKE AND WEST KIRBY GAS AND WATER COMPANY, LIMITED.

TENDERS FOR GAS COAL, &c.

THE Directors of the above-named Company are prepared to receive TENDERS for the supply of about 4500 Tons (more or less without restriction) of SCREENED GAS COAL, and about 700 Tons (more or less without restriction) of CANNEL, price to include delivery on Gas-Works Siding, Hoylake.

TENDERS are also invited for the supply of about 500 Tons (more or less without restriction) of STEAM COAL, NUTS, or WASHED SLACK, as required, price to include delivery on rails at West Kirby Stations.

Deliveries to extend in each case, as required, from the 1st of July next to the 30th of June, 1902.

The Directors reserve the right to accept Tenders for the whole or any portion of any Quantity offered, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders marked "Tenders for Coal," must be delivered to the undersigned, not later than Nine a.m. on Wednesday, the 5th of June next. No canvassing.

Printed Forms of Tender will be forwarded by post upon application in writing.

By order of the Board,
A. G. READDY,
Secretary.

5, The Quadrant, Market Street,
Hoylake, May 18, 1901.

KENT WATER-WORKS COMPANY.

SALE BY TENDER OF £60,000 FOUR-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK.

THE Directors invite Tenders for the ISSUE on SALE to the highest bidders of £60,000 FOUR-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK, authorized to be raised under the Kent Water-Works Act, 1888.

The Ordinary Capital of the Company raised is £868,000, which comprises £708,000 Capital Stock, on which the Dividend for the last Half Year was at the rate of 10 per cent. per annum, with a further Dividend of 4 per cent. per annum on account of back Dividends; and £160,000 New Capital Stock, on which the full Dividend of £7 per cent. has been paid since its issue.

The Loan Capital raised is £122,000—viz., £42,000 by Mortgages, and £80,000 by Debenture Stock.

This Stock is an authorized investment for Trustees.

Forms of Tender with Particulars and Conditions may be obtained on application to the Secretary.

Tenders must be sent in on or before Friday, the 14th of June.

By order of the Directors,
A. DICKSON, Jun.,
Secretary of the Company.

Kent Water-Works Offices:
Mill Lane, Deptford, S.E.,
May 15, 1901.

KENT WATER-WORKS COMPANY.

SALE BY TENDER OF THREE PER CENT. DEBENTURE STOCK (INTERCOMMUNICATION).

THE Directors invite Tenders for such amount of THREE PER CENT. DEBENTURE STOCK, or of any portion thereof being a multiple of £10, as may in the whole be sufficient to realize the sum of £11,512, being the Sum expended by the Company in the construction of Intercommunication Works under the provisions of the Metropolis Water Act, 1899.

This Stock may be redeemed at par at the option of the Company at any time after the expiration of 25 Years from the date of issue upon six months' previous notice to the registered holders thereof. It ranks *pari passu* with the other Debenture Stocks of the Company for the payment of Interest.

This Stock is an authorized investment for Trustees.

Forms of Tender with Particulars and Conditions may be obtained on application to the Secretary.

Tenders to be sent in on or before Friday, the 14th of June.

By order of the Directors,
A. DICKSON, Jun.,
Secretary of the Company.

Kent Water-Works Offices:
Mill Lane, Deptford, S.E.,
May 15, 1901.

APOLOGY

TO

Messrs. Fletcher, Russell, & Co., Ld.,

WARRINGTON, MANCHESTER, & LONDON.

13*th May*, 1901.

DEAR SIRS,

We, THE DORRATOR IRON CO., LTD., of Falkirk, Scotland, hereby UNRESERVEDLY APOLOGISE to you for having copied, pirated, and manufactured your Registered Design of Mantelpieces. We desire, however, to state in this our Apology that it was simply owing to misapprehension on our part, and we had no idea of doing anything wrong. We hereby undertake to allow you to publish this Apology in such papers and journals and as often as you may deem necessary, and to pay you all costs of publication and any other expenses which you may incur.

We thank you for allowing us to apologise instead of taking legal proceedings against us, and we hereby further undertake not to manufacture or pirate any designs of your Company in the future.

Sealed by THE DORRATOR IRON CO., Ltd.

in the presence of

SEAL.

JOHN BAIRD, *Managing Director and Secretary.*

ALEX. RUSSELL, *Director.*

CONTRACT FOR GAS COAL.

NOTICE is Hereby Given that the Urban District Council of Horncastle, in the County of Lincoln, are prepared to receive TENDERS for the supply of from 500 to 2000 Tons (Railway Weight) of best screened SILKSTONE GAS COAL and GAS NUTS, to be delivered by the 30th of June, 1902, in such quantities and at such times as the Council may direct.

The Coal to be sent in a dry condition, free from Hards, Smudge, Dirt, Shale, Pyrites, or other Impurities.

Sealed Tenders, marked "Tender for Gas Coal," to be sent to the Clerk to the Council, on or before the 11th day of June, 1901.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
S. GOE OVERTON,
Clerk to the Council.

2, Manor House Street,
Horncastle, May 17, 1901.

LURGAN GASLIGHT AND CHEMICAL COMPANY, LIMITED.

COAL WANTED.

THE Directors invite Tenders for the supply of 3500 Tons of best quality screened GAS COAL, and 100 Tons of STEAM COAL, delivered into the Works at Lurgan, or placed on Lighters, or on Rail, at Belfast.

Five Hundred Tons of the required quantity should be Scotch Coal, suitable for use in Hislop's Patent Regenerative Furnaces.

The Coal must be delivered in such quantities and at such times as the Directors may fix; but a large proportion can be taken before the 1st of November.

Each Cargo to be accompanied by a Certificate as to place of origin.

Tenders (in sealed envelope), accompanied by reference to Gas-Works using the Coal offered, should reach me not later than Saturday, the 1st of June, 1901.

The Directors do not bind themselves to accept the lowest or any Tender,

FRED. W. MAGAHAN,
Secretary.

Gas-Works, Lurgan,
May 6, 1901.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

NOTICE is Hereby Given that the Shareholders at their ORDINARY GENERAL MEETING held this day have declared a DIVIDEND OF 6 PER CENT. for the Year ending Dec. 31, 1900, of which 2 per cent. was distributed in October, 1900, by way of Interim Dividend, leaving the Balance of 4 per cent. (8s. per share) to be paid forthwith free of Income-Tax; and Notice is Hereby further given to the Holders of Share Warrants to Bearer of this Company that COUPON No. 22 is payable by the Company's Bankers, Messrs. Prescott and Co., Limited, 50, Cornhill, London, E.C., at the rate of 8s. per Coupon.

Coupons must be left with the Bankers three clear days for examination.

By order,
J. M. MACMORRAN,
Secretary.

1, East India Avenue,
Leadenhall Street, London, E.C.,
May 16, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.

400 £10 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, the 4th of June, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LOWESTOFT WATER AND GAS COMPANY.

NEW ISSUE OF £1300 FOUR PER CENT. PERPETUAL DEBENTURE STOCK, AND 400 £10 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 4, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Executors of the late John Read, Esq., and other Owners.

STOCKS AND SHARES
IN THE
HASTINGS AND ST. LEONARDS GAS COMPANY.
SEVENOAKS GAS COMPANY.
EAST GRINSTEAD GAS AND WATER COMPANY.
EASTBOURNE GAS COMPANY.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 4, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

MORTGAGEES' SALE.

IMPORTANT TO MANUFACTURING CHEMISTS AND OTHERS.

TO BE SOLD, the Lessee's interest in the Buildings, Lands, and Premises, containing about 1¼ acres, known as LITTLE ISLAND CHEMICAL WORKS, Co. Cork, together with the Machinery, Fixtures, and Plant attached thereto.

The Premises are situate on the Shore of the River Lee, about 5 miles from the City of Cork. There is a private Wharf where Vessels can load at the very door of the Factory. The business of manufacturing Aniline Dyes, Creosote, Pitch, &c., from Coal Tar has been for some Years, and is still, carried on at these premises.

For further Information, apply to GREGG, JERMYN, AND SONS, Solicitors, CORK.

WEYMOUTH CONSUMERS' GAS COMPANY.

(INCORPORATED BY ACT OF PARLIAMENT, 1867.)

AUTHORIZED CAPITAL:
ORDINARY, £114,000; LOAN, £28,500.
CAPITAL PAID UP:
ORDINARY, £74,030; DEBENTURE, £18,500.

SALE BY TENDER OF £10,000 3½ PER CENT. PERPETUAL DEBENTURE STOCK,
For the purpose of paying off a similar amount of Debenture Bonds bearing a higher rate of Interest.

MINIMUM PRICE, £98 PER CENT.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £10,000 of 3½ PER CENT. PERPETUAL DEBENTURE STOCK, to be issued under the provisions of the Company's Acts of 1867, 1875, and 1897.

Particulars and Forms of Tender may be obtained on application to the Undersigned; and Tenders must be sent in so as to be received at the Office of the Company, 71, St. Thomas Street, Weymouth, not later than Ten a.m., on Thursday, June 6, 1901.

The Stock will be allotted to the highest bidders; but no Tender will be accepted at a lower price than £98 for each £100 of Stock.

By order of the Board of Directors,
JAMES LOWE,
Manager and Secretary.

May 20, 1901.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

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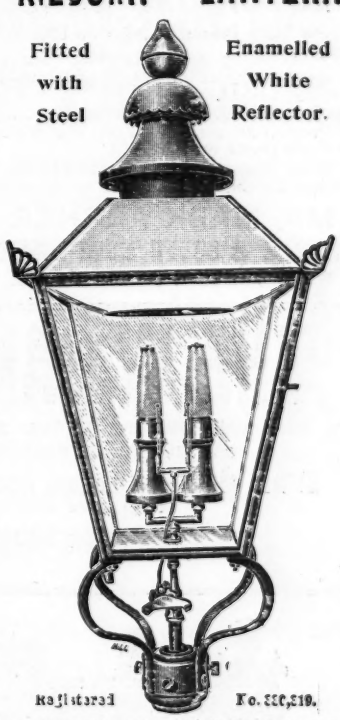

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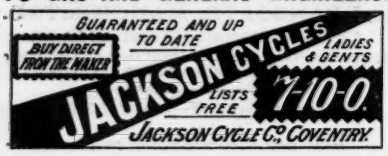

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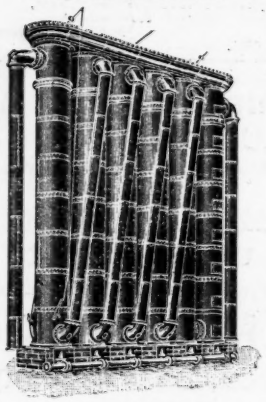

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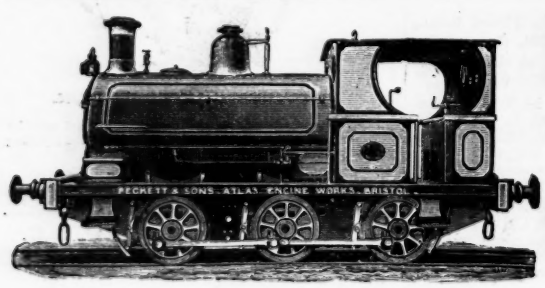

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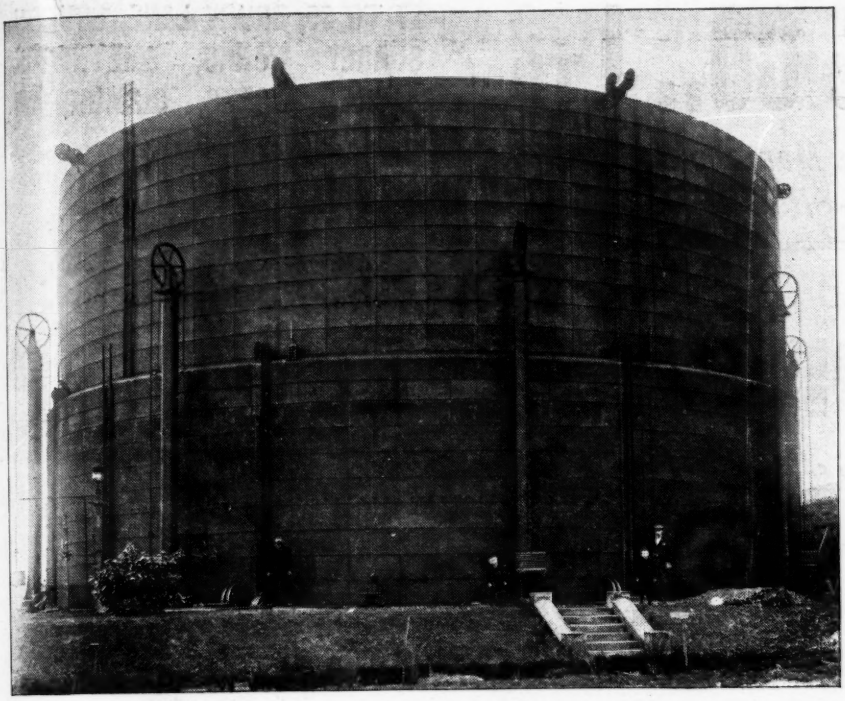

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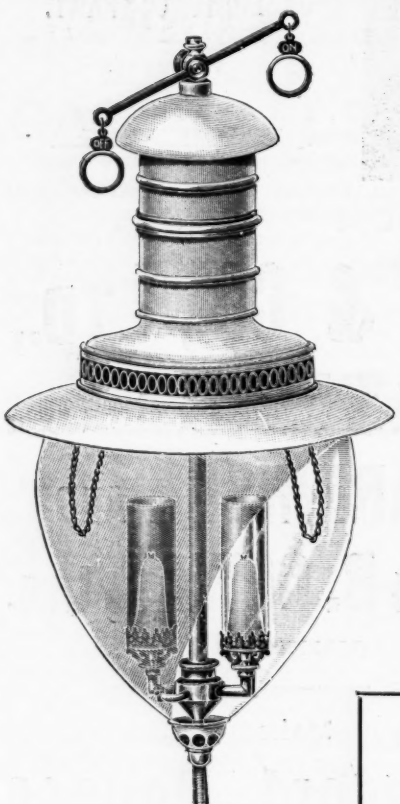

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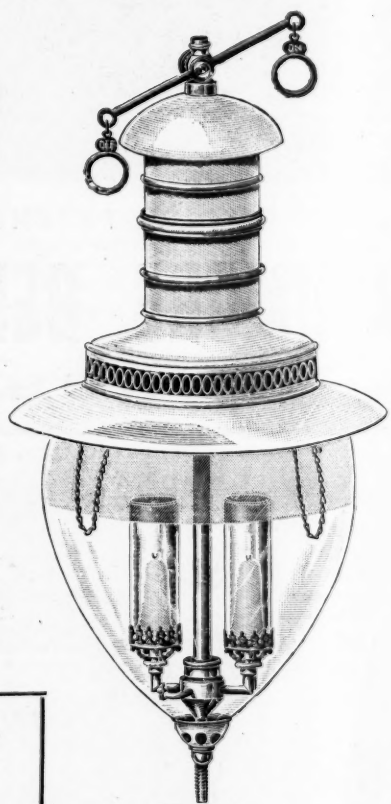

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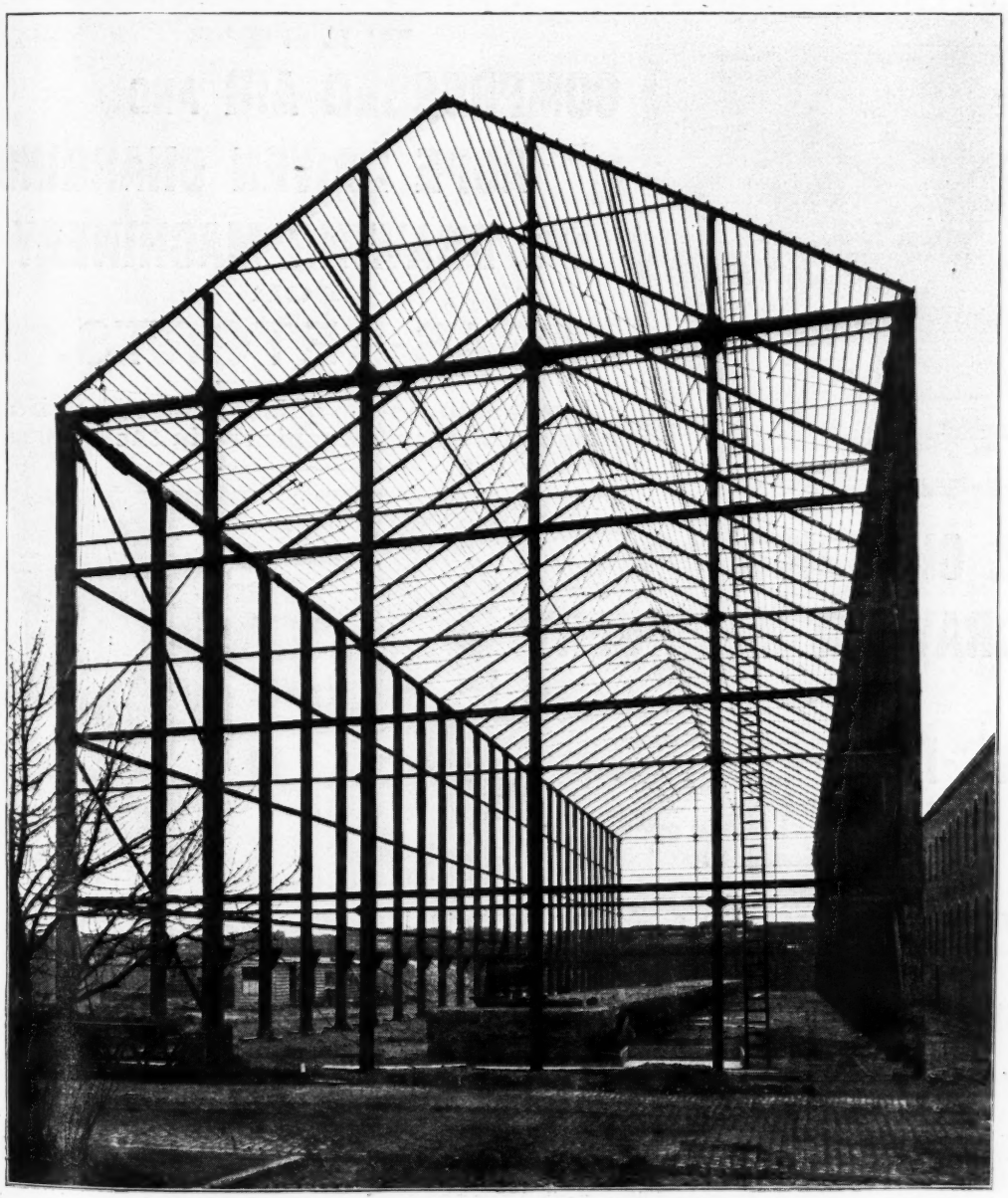

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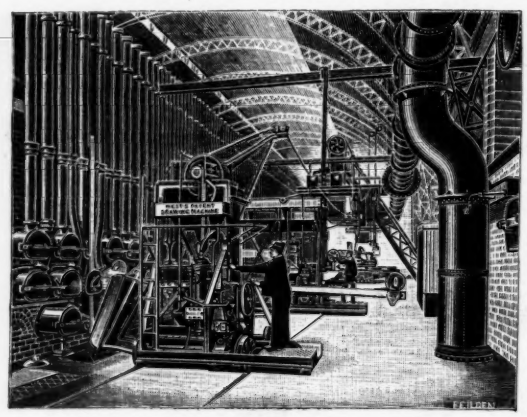

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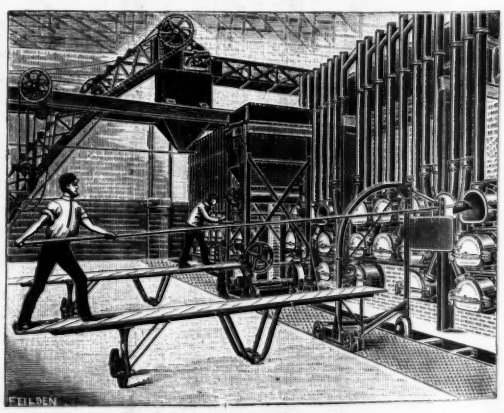

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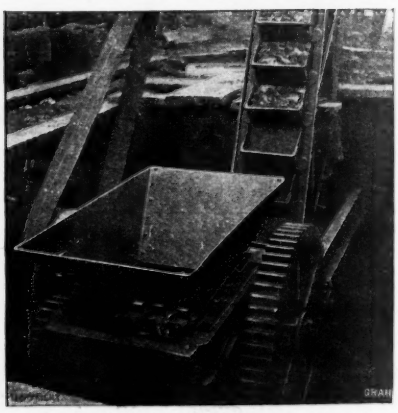

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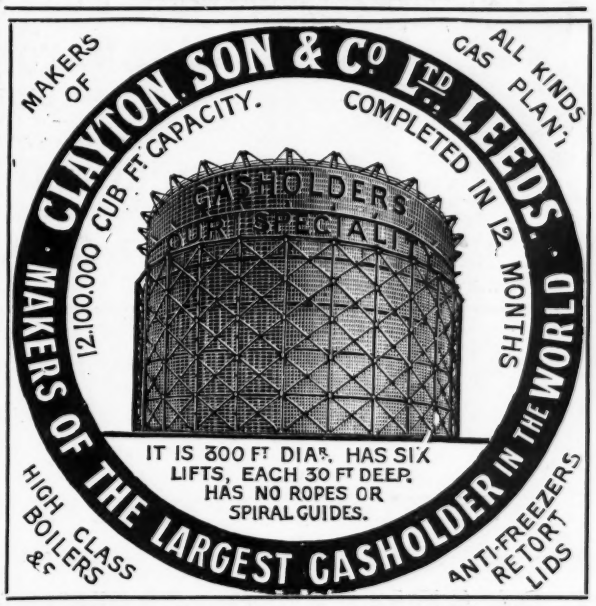
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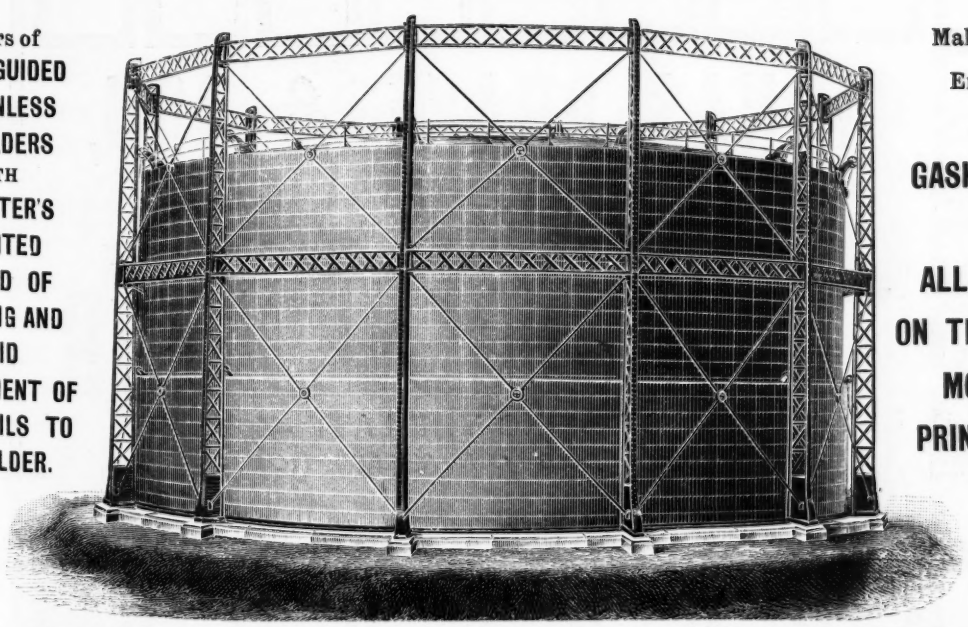

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